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The impact of space on students' perceptions of the value and quality of their learning experience: a case study of the Collaborative Learning Forum.

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Abstract

Universities in Australia and worldwide, are building a new generation of learning and teaching spaces which are designed to encourage and support active and collaborative modes of learning and teaching. However, there is little evidence to show that students will recognise the contribution these spaces make to their learning. Temple (2008) argued that spaces may become more salient to students once they are satisfied with the quality of learning and teaching that occurs within them. In the present study, ten teachers worked collaboratively to develop and implement active and collaborative approaches to learning and teaching in their respective units. These approaches drew upon the affordances of one of these new generation spaces at Macquarie University, namely, the Collaborative Learning Forum. Evidence from a student evaluation survey (n=279) confirms Temple's (2008) proposition and also suggests ways to encourage students to adopt a deeper approach to learning and to increase their satisfaction with the value and quality of their learning experience.

Introduction

It is perhaps axiomatic that a student's success at University depends largely upon their engagement, as evidenced by the "quality of effort and level of involvement" (Pascarella and Terenzini, 1991, p610). More engaged students achieve better grades (Astin, 1993; Indiana University Center for Postsecondary Research, 2002) and are more likely to persist with their studies (Pike, Schroeder & Berry, 1997). There is also strong evidence to suggest that levels of engagement are inextricably linked to the quality of learning and teaching they experience (Australian Council for Educational Research [ACER], 2010). Approaches to learning and teaching that promote student activity and collaboration have been shown to result in greater engagement, more positive attitudes towards the subject, better retention rates, higher academic achievement and the development of higher order thinking skills (Barman & Magee, 2000; Cohn, 1999; Cottell, 1998; de Caprariis, Tanenbaum, Cross, Tilson & Rodgers, 1998; Dundes, 2001; Felder & Brent, 1996; Johnson, Johnson & Stanne, 2000; Jungst, Licklider & Wiersema, 2003; Michaelsen, Knight & Fink, 2002; Millis & Cottell, 1998). Teachers, however, are often unwilling to adopt such practices because of concerns about the effectiveness of these activities, covering the curriculum, the time required to design activities, their ability to manage classroom activity and whether students possess the prerequisite skills to work in this way (Colbeck, Campbell & Bjorklund, 2000; Lord, 2001; Machemer & Crawford, 2007; Michaelsen, et al., 2002; Monk-Turner & Payne, 2005). Nevertheless, when provided with appropriate professional development opportunities, teachers are able to overcome these concerns and implement effective active and collaborative approaches in their units (Gibbs & Coffey, 2004; Jungst, et al., 2003).

In many instances, teachers in higher education default to the lecture as their primary mode of instruction (Lammers & Murphy, 2002), particularly for large groups. Whilst lectures can be superior to other modes when the objective is for students to learn facts and general information (Bligh, 2000; Good & Brophy, 2003), they tend to diminish student motivation and suffer from high rates of absenteeism (Moore, Armstrong & Pearson, 2008). Kuh, Kinzie, Buckley, Bridges and Hayek (2006) regard lectures as being "contrary to almost every principle of an optimal learning environment" (p68). In a wide-ranging review, Barnett and Temple (2006) found that "The demise of the formal

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lecture has long been predicted, based on empirical findings as to its general ineffectiveness as a means of learning. Nothing that we have heard or seen, however, suggests that this will happen in the foreseeable future" (p12). Fortunately, there exists a wide variety of techniques that teachers can employ to encourage greater student activity in their lectures and these "may go some way towards addressing some of the problems that are being encountered in the context of large group teaching" (Mulryan-Kyne, 2010, p175). The Scottish Funding Council (2006) has an even bolder view of the future of the lecture, arguing that they be "transformed to incorporate multiple learning modes" (p6). A significant barrier to such pedagogical innovation, however, may be the nature of the spaces in which lectures are currently being delivered.

In a general sense, the design of a particular space tends to limit the activities of those who occupy it (Lefebvre, 2001). In particular, the design of the traditional lecture theatre is a "manifestation of particular power relations between teacher and student …[which reinforces]… traditional, narrowly defined roles" (Jamieson, 2003, p121). This limits teachers' choice of pedagogical approach and reinforces their use of teacher-centred pedagogical practices (Biggs, 1999). In recognition of this, some argue that innovations in learning and teaching space design may prove to be a powerful agent for changing those practices (Oblinger, 2006).

Universities in Australia (Radcliffe, Wilson, Powell & Tibbetts, 2008) and worldwide (OECD, 2006; Scottish Funding Council, 2006) are developing a new generation of learning and teaching spaces for class groups of different sizes that are designed to support the range of active and collaborative pedagogical practices which have been shown to improve student engagement, learning, satisfaction and retention (ACER, 2010; Springer, Stanne & Donovan, 1999). However, the role of space in promoting pedagogical innovation has not been a prominent theme in the higher education literature (Jamieson, Fisher, Gilding, Taylor and Trevitt, 2000) and, therefore, it is far from clear that the mere provision of space will necessarily lead to a change in teacher practice and a change in student experience. Nevertheless, evidence is emerging which shows that space can promote pedagogical innovation (Hunley and Shaller, 2009), but it is the professional development of teachers that mediates the effect of space on student outcomes (Galatis, Williams, Black & Putland, 2009). Further, these professional development activities need to be sustained, because without ongoing support teachers have a "tendency to revert to traditional practice" (Neary, Harrison, Crellin, Parekh, Saunders, Duggan, Williams & Austin, 2010).

The impact of space on students, the other group involved in the learning and teaching process, is even less well researched. Whilst they do express a preference for spaces with views of the outside world, adequate lighting, temperature control and comfortable seating (Douglas & Gifford, 2001), evidence suggests that the characteristics of spaces do not impact directly on their satisfaction with the quality of their learning, over and above their perceptions of the quality of teaching they experience in those spaces (Wiers-Jenssen, Stensaker & Grogaard, 2002). However, Temple (2008) theorised that space may become more salient to students once they are satisfied with the quality of learning and teaching they experience.

The main purpose of the present study is to explore Temple's (2008) notion in terms of the impact of a particular innovative space, the Collaborative Learning Forum, on students' perceptions of the value and quality of their learning experience. The nature of this experience was shaped by their teachers' participation in a collaborative project that aimed to develop high quality active and collaborative approaches to learning and teaching that are appropriate for the Forum. It is also hoped that results will shed light on ways to improve the students' learning experiences.

The Collaborative Learning Forum

The Forum fulfils the Scottish Funding Council's (2006) vision of a space designed to support a variety of learning and teaching modes. It was produced by redeveloping an existing lecture theatre which housed around 220 students, to produce a venue that was intended to support both lecture and

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active and collaborative modes for classes of around 100 students. The performance area at the front was raised and the steeply raked seating area was replaced with three wide tiers in a concave arc. The traditional fold down seats with writing tablets attached were replaced with 100 individual chairs that move on castors and six long arced benches, two per tier. When all chairs are facing forward the space functions as a traditional lecture space. In collaborative mode, students seated at the frontmost desk of each tier swivel their chairs to face the rear of the space to work with those on the bench behind, and because of the reduction in seating capacity and the placement of the benches there is sufficient space for students and teachers to move freely within and between tiers even when the space is filled to capacity.

The Forum Project

The Forum project, funded by two learning and teaching grants from Macquarie University, was initiated by the first author as part of an ongoing study into the role that innovation in learning and teaching spaces plays in supporting and encouraging pedagogical innovation. Central to the project are the findings, discussed earlier, that professional development of teachers is critical for sustaining pedagogical innovation within innovative spaces. The project was structured around a number of principles that define effective professional development (Centre for Educational Research and Innovation, 1998; Hawley & Valli, 1999). Rather than being centrally organised and consisting of workshops and other highly structured activities (Kember, 2008; Licklider, Fulton & Schnelker. 1997), it was based around Lave and Wengner's notion of a Community of Practice (Lave & Wenger, 1991; Wenger, 1998; Wenger, McDermott & Snyder, 2002).

The ten teachers who participated in the project taught on seven units which represented a diverse range of academic disciplines, including Education, Statistics, Law, Chiropractic, and Marketing. They all reported that they had previously incorporated active and collaborative elements into their teaching in these units, but they felt hamstrung because the more traditional spaces they had been allocated in the past did not support those practices well. They all saw the Forum as an opportunity to extend and refine their practices, and they believed that this would further enhance their students' learning. Finally, all valued the opportunity to do this in collaboration with others of like mind.

Participating teachers were encouraged to think about their classroom activities according to Beetham's (2007) model, which defines an activity as "a specific interaction of learner(s) with other(s) using specific tools and resources, oriented towards specific outcomes" (p28). After an initial round of consultation and peer observation, in which they documented their conceptions of desired learning outcomes, the affordances of the learning environment, the needs of the learners, and the roles the learners and the teacher would play in learning activities, research assistants provided reviews of relevant literatures to each participant. These served to provide a stronger theoretical foundation for their ongoing experimentation and reflection.

What emerged from this initial phase of the project was a consensus view of what constitutes quality learning and teaching practice in the Forum. This can only be summarised here. All teachers used a variety of learning and teaching modes in their classes in the Forum. These included more traditional lecture formats, whole class discussions and case based (Gijbels, Dochy, Van den Bossche & Segers, 2005; Parton & Bailey, 2008; Savery & Duffy, 2005) or problem based (Gemmell, 2007; Pariseau & Kezim, 2007; Srinivasan, Wilkes, Stevenson, Nguyen and Slavin, 2007) learning activities in which students worked collaboratively in small groups (Barkley, Cross & Major, 2005; Johnson, Johnson & Smith, 1991). These were either informal groups (ie temporary groups that last for one class period) or base groups (ie a long term group with a stable membership). In all cases the learning activities were conceived of as opportunities for students to apply the knowledge and skills that were introduced in the lectures to tasks that were closely aligned to the unit's assignments (Biggs, 1999; 2003). The activities and the assignments were together conceived of as a scaffold for the development of deep knowledge of (Biggs, 1999) and critical thinking about, the discipline. The mix of these learning modes varied between classes, both within and between the participants' units. Based on this

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consensus, a set of indicators of quality was derived and these served to inform the development of items for the student evaluation questionnaire used in the present study.

The Student Evaluation Questionnaire

The student evaluation questionnaire was developed both as a means of providing information to improve the quality of learning and teaching in the Forum (Denson, Loveday & Dalton, 2010) and as a means to evaluate the impact of the Forum on students' perceptions of the quality of that learning and teaching. It assessed student satisfaction with the quality and value of their learning experience as well as factors relating to their experience of the learning and teaching process in the Forum, their characteristics as learners (both individually and collectively) and whether they believed the Forum effectively supported the activities they experienced there.

Student satisfaction with the quality of their learning experience was assessed with a single five point rating scale item (strongly agree [5], agree [4], neither agree nor disagree [3], disagree [2], strongly disagree [1]) which measured the degree to which they were satisfied that their class in the Forum provided them with "a high quality and valuable learning experience".

In the context of the Forum, as previously discussed, quality learning and teaching implies that students were provided with opportunities to be active and collaborative in class, that these in-class activities enhanced their learning, and that staff acted in ways that supported that learning. The active and collaborative learning scale was comprised of four, five point, rating scale items (strongly agree [5], agree [4], neither agree nor disagree [3], disagree [2], strongly disagree [1]) which assessed the degree to which students recognised that they worked on activities which enabled them "to practise the skills and to apply the knowledge we had been taught in this unit", that they were provided with an opportunity to "work with other students on these in-class activities", that they received suggestions and feedback from staff which helped them "progress with their work", and that they had an opportunity to discuss the "outcomes of these in-class activities as a whole class". Principle components analysis of the data from this study revealed a single component (eigen value=2.53), which explained 63% of the item variance, with all component loadings greater than 0.74. The reliability of the scale was high (Cronbach's alpha=0.803).

Three, five point rating scale items (strongly agree [5], agree [4], neither agree nor disagree [3], disagree [2], strongly disagree [1]) assessed the degree to which students believed that these in-class activities enhanced their learning. Items established whether students believed the activities facilitated a "deeper understanding of how to approach solving these types of problems or tasks", prepared them to "tackle the unit's assessment tasks effectively" and enhanced their "critical thinking ability". Principle components analysis revealed a single component (eigen value=2.14), which explained 71% of the item variance, with all component loadings greater than 0.80. The reliability of the scale was high (Cronbach's alpha=0.796).

The degree of staff support was assessed with a single seven-point bipolar rating scale item that was drawn from the Australasian Survey of Student Engagement (ACER, 2010). The two contrasting statements portrayed staff as either being "available, helpful and sympathetic to my needs as a learner" [7] or "unavailable, unhelpful and unsympathetic to my needs as a learner" [1].

In addition to these characteristics of the learning and teaching environment, it was believed that certain learner characteristics might also influence student satisfaction with the quality of their learning experience. Since students were expected to work collaboratively in the forum, it was expected that their preference for working either collaboratively or alone, as well as their perceptions of the support they received from their peers, might be important.

Four items from Lizzio and Wilson's (2006) group readiness questionnaire were used to assess students' work preferences. Two items related to a preference for working "alone" and two items for

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working "with others". Responses were made on a five-point frequency scale (almost always [5], frequently [4], half the time [3], sometimes [2], never-rarely [1]). Principle components analysis revealed two components which together accounted for 73% of the item variance. The two working "with others" items loaded on the first component (initial eigen value=1.72, varimax rotated component loadings > 0.87, cross component loadings < 0.12) and the two working "alone" items loaded on the second (initial eigen value=1.19, varimax rotated component loadings > 0.81, cross component loadings < 0.12). The two scales were moderately reliable (Cronbach's alpha=0.706 and 0.532 respectively).

The degree of peer support was assessed with a single bipolar seven-point rating scale item that was drawn from the Australasian Survey of Student Engagement (ACER, 2010). The two contrasting statements portrayed the peer environment as either being "friendly and supportive and I felt I belonged to a community of learners" [7] or "unfriendly and unsupportive and I felt a sense of alienation from the class" [1].

Further, since the goal of the learning and teaching activities in the Forum was to develop deep as opposed to surface knowledge, it was expected that those with a deep approach to learning would respond more positively to the learning and teaching environment than those with a more surface approach to learning. Eight items were drawn from the twenty item Revised two-factor Study Process Questionnaire (Biggs, Kember, & Leung, 2001), four from the deep approach scale (items: 1, 6, 17, 18) and four from the surface approach scale (items: 2, 12, 15, 34), but in some instances the wording was changed slightly to better reflect the learning environment in Forum. Responses were made on a five-point frequency scale (Almost always [5], frequently [4], half the time [3], sometimes [2], never-rarely [1]). Principle components analysis revealed two components that together accounted for 54% of the item variance. The four surface approach items loaded on the first component (initial eigen value=2.98, varimax rotated component loadings > 0.64, cross component loadings < 0.24) and the four deep approach items loaded on the second (initial eigen value=1.69, varimax rotated component loadings > 0.59, cross component loadings < 0.20). The reliability of these two scales was moderate to high (Cronbach's alpha=0.797, 0.705 respectively).

Finally, in order to assess the contribution of the Forum itself to students' learning, students responded to a single, five-point rating scale item (strongly agree [5], agree [4], neither agree nor disagree [3], disagree [2], strongly disagree [1]) which assessed the degree to which they believed that the characteristics of the Forum "effectively supported students to engage in the range of teaching methods used in this class".

Respondents

The questionnaire was distributed to all students who attended classes for the seven participating units in the Forum during the last two weeks of semester two in 2011. They were given fifteen minutes to record their responses before all questionnaires, whether completed or not, were collected. Of the 354 questionnaires that were distributed, 312 contained some form of response (response rate=88%). However, thirty-three of these were only partially completed and therefore were not included in the analysis (n=279).

In terms of demographic characteristics, the median age range of the sample was 20-24 years, 64% were female, 31% were international students, 29% were from a non-English speaking background and 96% were studying full time.

Results

A two-layer exploratory path model, explaining student satisfaction with the quality of their learning experience, was built from a collection of separate univariate regression models (see Figure 1). These regression models resulted from the application of a multi stage variable reduction procedure.

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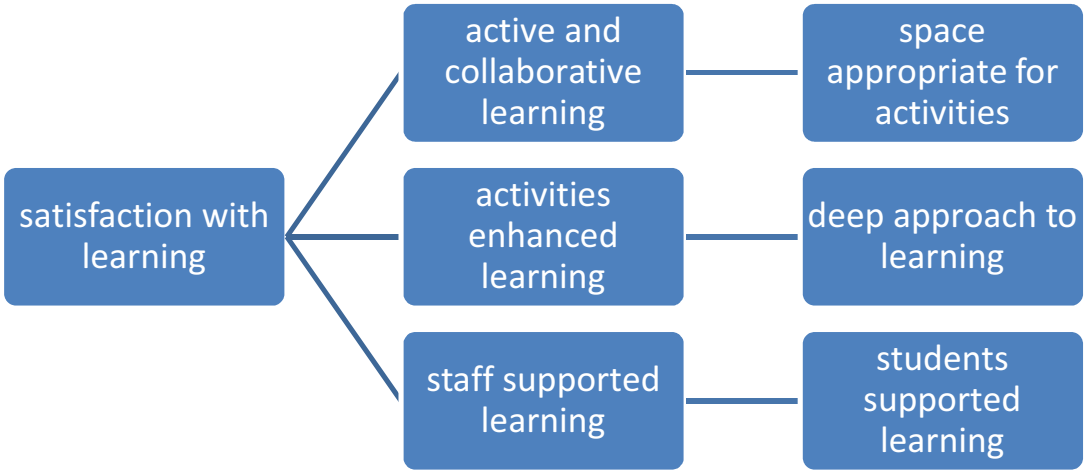

Figure 1, Exploratory path model that explains student satisfaction with the value and quality of their learning by their perceptions of their learning experience, their characteristics as learners and their perceptions of the appropriateness of the space.

The final first layer regression model showed that students' satisfaction is significantly predicted ($F_{3,266}$=102.865, r^2=0.537) by the degree to which students felt supported by staff (standardised regression coefficient [src]=0.173), perceived the in-class activities as being active and collaborative (src=0.205) and perceived these activities as enhancing their learning (src=0.474). The three-stage procedure that produced this final mode is as follows. Firstly, satisfaction was regressed upon all nine independent variables. The independent variables were significantly related to satisfaction as a group ($F_{9,260}$=34.903, p<0.001, r^2=0.547), but only staff support (p=0.001), active and collaborative learning (p=0.003) and enhancement of learning (p<0.001) were significant adjusted for all else. Secondly, a stepwise regression model building procedure (p-in=0.01, p-out=0.05) confirmed that no single independent variable, other than these three, explained significant additional variance in satisfaction. Finally, a partial F-test revealed that the remaining six variables as a group did not explain significant additional variance in satisfaction ($F_{6,260=}$0.964, p=0.45).

The second layer of the path model was built to determine whether any of the independent variables that were not implicated in the first layer were significantly, and uniquely, related to the three variables that did predict satisfaction, namely, staff support, active and collaborative learning, and enhancement of learning. A similar regression model building approach to that described for the first layer was applied for each of these three now dependent variables.

The final second layer regression models (see Figure 1) reveal that: student support is significantly related to staff support (p=0.001, src=0.171), enhanced learning is significantly related to deep approach (p=0.01, src=0.109) and active and collaborative learning is significantly related to the effectiveness of the space (p=0.001, src=0.150). The three-stage procedure that produced each of these three final models is as follows.

Staff support, adjusted for both enhanced learning and active and collaborative learning, was regressed upon the six remaining independent variables. The independent variables were significantly related to staff support as a group ($F_{8,262}$=14.408, p<0.001, r^2=0.272), but only student support (p=0.001) was significant adjusted for all else. The stepwise regression model building procedure (p-in=0.01, p-out=0.05) confirmed that no single independent variable, other than student support, explained

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significant additional variance in satisfaction. Finally, a partial F-test revealed that the remaining five variables as a group did not explain significant additional variance in satisfaction ($F_{5,262}$=0.349, p=0.883).

Enhanced learning, adjusted for both staff support and active and collaborative learning, was regressed upon the six remaining independent variables. The independent variables were significantly related to enhanced learning as a group ($F_{8,262}$=40.644, p<0.001, r^2=0.272), but no variable was significant adjusted for all else (p=0.01). However, the stepwise regression model building procedure (p-in=0.01, p-out=0.05) showed that while deep approach was significant (p=0.01), no other single independent variable explained significant additional variance in satisfaction. Finally, a partial F-test revealed that the remaining five variables as a group did not explain significant additional variance in satisfaction ($F_{5,262}$=1.465, p=0.202).

Active and collaborative learning, adjusted for both enhanced learning and staff support, was regressed upon the six remaining independent variables. The independent variables were significantly related to active and collaborative learning as a group ($F_{8,262}$=34.790, p<0.001, r^2=0.515), but only effectiveness of the space (p=0.006) was significant when adjusted for all else. The stepwise regression model building procedure (p-in=0.01, p-out=0.05) confirmed that no single independent variable, other than effectiveness of the space, explained significant additional variance in active and collaborative learning. Finally, a partial F-test revealed that the remaining five variables as a group did not explain significant additional variance in enhanced learning ($F_{5,262}$=1.656, p=0.146).

Discussion

In the Forum Project, staff worked collaboratively and drew on the affordances of the space to create supportive learning environments in which active and collaborative approaches to learning and teaching were employed in order to create an experience that maximised student engagement and learning. The main question explored in this research was whether, as Temple (2008) postulated, their perceptions of the space were related to their satisfaction with that experience, over and above their perceptions of the learning and teaching process. A further goal was to identify strategies that could improve their perceptions of that experience.

The path model demonstrated that students' satisfaction with the quality and value of their experience in the Forum was directly related to their perceptions of the nature of the learning and teaching process. This finding echoes previous research (Wiers-Jenssen, Stensaker & Grogaard, 2002). However, the characteristics of the space and their characteristics as learners were indirectly related to satisfaction, their effects being mediated by specific aspects of the learning and teaching process.

Students who were satisfied tended to regard staff as being supportive (Denson, Loveday & Dalton, 2010) and when students viewed staff as being supportive they also viewed their fellow students in the same light. This suggests that while these staff were generally successful in creating supportive learning environments there are some students who did not recognise this. It may be that these students favour the more traditional teacher centred approaches that are commonly employed in Universities (Lammers & Murphy, 2002; Bligh, 2000; Good & Brophy, 2003) and require more support to become engaged with these active and collaborative environments. Lizzio and Wilson (2006) show that in order to ensure all students benefit, and recognise those benefits, from these approaches to learning and teaching they require "both practical and psychological scaffolding" (p701) which involves staff "valuing and validating students' concerns …[in order to] engage those who may be reluctant to deepening their level of investment in the process" (p701).

Students who were satisfied also tended to recognise that their in-class experiences served to enhance their learning, and this in turn was predicted by the degree to which they adopted a deep approach to learning. In simple terms, this pattern of relationships imply that it is the deep learner who recognises that what happens in these classes provides them with a "deeper understanding", prepares them to

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"tackle the unit's assessment tasks [more] effectively" and enhances their "critical thinking ability" (ie those attributes assessed in this study which defined enhanced learning). There is abundant evidence to show that the approach a teacher takes to teaching, profoundly influences the approach a learner takes to learning (Gow & Kember, 1993; Kember & Gow, 1994; Trigwell, Prosser & Waterhouse, 1999; Sheppard & Gilbert, 1991). Further, Biggs (1999) demonstrates that "learner activity…[and] interaction with others" (p73) are two important factors which encourage a deep approach to learning. Therefore, the link between teachers' pedagogical practices and students' approaches to learning is a reciprocal one and while these staff did adopt active and collaborative approaches to learning and teaching it may be that if they had paid more "attention to framing the positive purpose and value of exercises" (Lizzio and Wilson, 2006), more students would have adopted a deep approach to learning, recognised the extent to which the learning environment supported that learning, and be more satisfied with that experience.

Finally, students who were satisfied with the value and quality of their experience in the Forum tended to recognise that they were engaged in active and collaborative learning and it was these students who recognised the contribution that the space itself made to this. This finding tends to confirm Temple's (2008) view that it is only when students recognise and value the nature of the pedagogy that is designed to leverage the affordances of a particular innovative space, that they are able to recognise the ways in which that space supports those pedagogical practices.

In the first phase of the Forum project, attention was paid to the development and implementation of active and collaborative approaches to learning and teaching in that space. However, it is clear from the results of this study that additional strategies need to be developed in order to ensure that more students engage with the learning and teaching process. In the next phase of the project staff will collaboratively develop and implement such strategies and their success will be judged by whether more of the next cohorts of students view staff and students as being supportive of their learning, recognise the active and collaborative nature of learning and teaching in the Forum, understand that these activities are designed to enhance their learning, and adopt a deeper approach to their learning. If these improvements can be achieved, one would expect that there would be a stronger association between their satisfaction with the value and quality of their learning experience and the affordances of the space itself.

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