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# Students' Perceptions of the Value of the Elements of an Online Learning Environment: An Investigation of Discipline Differences

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***Abstract*—**This paper presents a large scale, quantitative investigation of the impact of discipline differences on the student experience of using an online learning environment (OLE). Based on a representative sample of 2526 respondents, a number of significant differences in the mean rating by broad discipline area of the importance of, and satisfaction with, a range of elements of an OLE were found. Broadly speaking, the Arts and Science and Technology discipline areas reported the lowest importance and satisfaction ratings for the OLE, while the Health and Behavioural Sciences area was the most satisfied with the OLE. A number of specific, systematic discipline differences are reported and discussed. Compared to the observed significant differences in mean importance ratings, there were fewer significant differences in mean satisfaction ratings, and those that were observed were less systematic than for importance ratings.

***Keywords*—**Discipline difference, Learning management system, Online learning environment, Student evaluation.

## I. INTRODUCTION

ONLINE learning environments (OLEs) are perhaps currently the most widely used and most expensive educational technology tool [1]–[2], and, like many other learning technology trends before them, have been adopted by higher education institutions almost automatically and uncritically [3]. Research into the ways of knowing and ways of teaching suggest fundamental differences between discipline areas [4]–[5], yet much of the research into online learning seems to assume no influence from discipline context [6] or other demographic characteristics of system users [7]. The identification of the need for more detailed exploration of the impact of demographic differences on the user experience of online learning can be found in the literature [8], particularly calls for more research into the impact of discipline area differences [6]–[7], [9]–[11]. This paper presents a large scale, quantitative investigation of the impact of discipline differences on the student experience of using an OLE.

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## II. THE INFLUENCE OF DISCIPLINE DIFFERENCE ON OLES

What evidence of discipline area as an influence on student engagement with OLEs can be found in the literature? In a UK study [4] that investigated the differences between the humanities, psychology and the physical sciences, it was reported that online discussions featured more in humanities subjects, less so in psychology and least of all in the physical sciences. The authors posited that this finding might be explained by the physical sciences discipline being more likely to employ individual rather than group work, as well as more likely to use task-based learning activities rather than discussion-based or collaborative work. A large meta-analysis of 232 studies relating to distance education [12] found differences in the 'suitability' of disciplines to off-campus modes of study. The authors concluded that science, engineering and mathematics (SEM) discipline areas were better suited to classroom-based instruction, so presumably less amenable to online modes of study, while business studies seemed to be well suited to the distance education format, hence presumably offering better opportunities for the application of online learning approaches. In reporting on the factors for instructional designers to take into account when developing courses for online delivery, and drawing on the experiences of the UK Open University [13], one salient characteristic identified was the wide variation in access to computing equipment between discipline areas. Students in the arts and health areas had lower access to computers than student enrolled in information technology and business studies, so potentially arts and health students may not be able to engage in online learning in the same way as other groups of students.

A UK JISC research project [14] that included an investigation of subject discipline differences in the use of technology by students, based on 427 online survey responses, 85 audio diaries and 14 in-depth interviews, found that while technologies were an important part of learning for all students, those from medical disciplines gave it the highest importance rating, and were particularly more likely to use OLEs to gain access to and manage course material. Based on a discipline area division of 'hard' (i.e., natural sciences, engineering, health sciences, etc.) and 'soft' (social sciences, humanities, education, etc.), and a continuum of e-learning methods from 'passive' (i.e., downloading notes from the

web) to 'active' (i.e., online discussions and collaborative wikis), 286 students at a UK university were surveyed to identify which e-learning methods they were using and to rate their perception of their usefulness [5]. The authors report that the student responses broadly supported the proposition that students in the hard areas value more passive e-learning approaches, whereas students in the soft disciplines most valued more active approaches. In an investigation of US course instructors involved in e-learning, based on 60 survey responses and 20 interviews with staff from a range of discipline areas [6], a key discipline difference was observed. Mathematics instructors were significantly less satisfied than those from other discipline areas, and the authors posit that this may be due to OLEs being poor at communicating mathematics notation and diagrams, and hence imposing an extraneous cognitive load on students and staff that is over and above the actual teaching and learning of mathematics concepts. There is evidence that discipline of study may make a difference in the way(s) that students use and perceive OLEs.

## III. OLEs at Deakin University

In Australia, Deakin University is a major provider of distance and online education. In addition, it teaches on-campus at four campuses located in three cities in the State of Victoria. Initially, Deakin saw itself as a major distance education provider, with some degree of separation between its teaching methods and materials used for on-campus teaching as opposed to off-campus teaching. The use of distance education methodologies and materials for both student cohorts gathered momentum in the early to mid-1990s under the strategic umbrella of flexible teaching and learning, and with a growing 'technological imperative' [15] for the use of online systems for learning delivery and communication. Starting first with a range of different systems used in different academic departments of the university, and primarily used for particular courses, units of study or functions, the university gradually moved toward centralisation through the implementation of a corporately supported learning management system (LMS).

Iterating through a number of commercial LMSs, the university eventually settled on the WebCT LMS in 2003, branding it internally as Deakin Studies Online (DSO). The new LMS was trialled in 2003, and fully implemented in 2004. Concurrently, the university introduced policies requiring academic departments to migrate all OLE activity to the centrally supported LMS. University policy identified three classifications of online units: Basic Online (administrative support for unit); Extended Online (at least one component of teaching in the unit occurs online); and Wholly Online (all of the teaching of a unit occurs online) [16], with these categories being analogous to those employed more widely in the sector [17]. While there was significant use of online teaching and learning systems at Deakin prior to the introduction of DSO, and in some academic areas the breadth of usage was wide and the level of use comparatively sophisticated, across the entire university usage was varied and far from universal. Another key initiative in the university's strategy to expand its online and distance education profile was to require that, from 2004, all its units of study have at least a 'Basic' online presence, where 'Basic' was defined in detail as:

"… Essential elements

- information about the unit (typically as a unit guide)
- a discussion forum for student queries
- a notification facility for unit announcements
- a statement of expectations indicating how students are expected to communicate with staff, which will include how frequently staff in the unit will access the student queries discussion forum and how frequently students are expected to access the forum.

Additional elements

- Optional support elements may include electronic resources for the unit if available." [16]

Given the scope of Deakin University's commitment (in terms of central infrastructure, policy development, and roll-out of online elements to all taught units) to online education, it was considered essential to evaluate the effectiveness of this investment. This current investigation focuses on the 2526 responses obtained from students at Deakin University, seeking to identify what elements of the OLE were valued and used most by students. The investigation seeks to provide a quantitative analysis of the perceptions of an OLE from a comparatively large sample of students, and to highlight any influence of discipline variables on these perceptions, thereby making a significant contribution to the literature in this area. Given that many Australian universities have recently determined or are currently deliberating on their next generation OLE, a better understanding of these factors will allow more informed policy and decision making regarding future developments in this area that is so important to all those engage in teaching and learning endeavours at Deakin University.

## IV. Methodology

During a recent academic teaching session, all students at Deakin University were invited to complete the DSO evaluation survey. The DSO evaluation survey sought responses from students relating to:

- demographic and background information;
- perception of importance and satisfaction with a range of OLE elements;
- a number of overall OLE satisfaction measures; and
- open-ended written comments about the OLE.

The complete DSO evaluation survey is included in the Appendix. As required by Deakin University human research ethics procedures, the survey was anonymous and voluntary. The collected data were analysed and the following information was compiled:

- response rate and demographic comparison information; and
- importance and satisfaction analysis.

Survey items relating to support in the use of, and general satisfaction with, DSO, while important, are not reported here.

## V. Results

### A. Response Rate and Demographic Information

Table I provides a summary of the response rate and demographic information for the overall enrolled student population and survey respondents. The effective response rate was 7.8%. A range of demographic information was available for the overall enrolled student population [18] as well as collected as part of the survey, including gender, mode of study, level of study, enrolled faculty, and campus attended. This permitted a comparison between the respondent sample and the overall student population on these demographic dimensions, as presented in Table I. Although the response rate obtained was comparatively low, it was not unexpected for an online voluntary survey [19], and the generally good match between the sample and population demographic characteristics suggests confidence in drawing more general inferences about the Deakin University student population from the respondent data. An investigation of the influence of gender, mode of study and level of study demographic variables on student perceptions of the OLE has been conducted and reported elsewhere [20].

TABLE I
Response Rate and Demographic Information

| | Sample | Population |
|---|---|---|
| **No. of Respondents** | 2526 | 32354 |
| **Gender** | | |
| Female | 61.5% | 57.3% |
| Male | 38.5% | 42.7% |
| **Mode of study** | | |
| On-campus | 61.8% | 64.7% |
| Off-campus | 38.2% | 35.3% |
| **Level of study** | | |
| Undergraduate | 75.1% | 73.7% |
| Postgraduate | 24.9% | 26.3% |
| **Faculty** | | |
| Arts | 16.0% | 20.0% |
| Business and Law | 34.4% | 36.9% |
| Education | 12.0% | 13.7% |
| Health and Behavioural Sciences | 17.6% | 14.2% |
| Science and Technology | 20.1% | 15.2% |
| **Campus†** | | |
| Burwood | 52.5% | 58.3% |
| Toorak | 6.8% | 5.5% |
| Waurn Ponds | 25.8% | 19.6% |
| Waterfront | 7.5% | 6.3% |
| Warrnambool | 4.7% | 5.3% |
| Offshore | 2.7% | 5.0% |

†In 2008, Deakin divested itself of the Toorak campus, with all Toorak operations moving to the Burwood campus

### B. Overall Importance and Satisfaction Results

The DSO evaluation survey asked respondents to rate the importance of, and their satisfaction with, a range of elements of the OLE at Deakin University. A rating of 1 represented low importance, while a rating of 7 represented high importance. A rating of 1 represented low satisfaction, while a rating of 7 represented high satisfaction. For both importance and satisfaction a 'not applicable' option was also provided to permit students not using a particular element to avoid having to provide a contrived rating. Table II provides a summary of the mean responses for the importance and satisfaction ratings, with the standard deviation of the means given in parenthesis. For some OLE elements the standard deviation of the mean rating is comparatively high, indicating significant variation amongst the ratings given by individual students. As noted in the literature, "Gathering samples of students and amalgamating them into averages produces an illusory 'typical learner,' which masks the enormous variability of the student population." [21] The following sections investigate whether there are systematic differences in the rating of particular OLE elements between the discipline groupings identifiable in the data collected in the DSO evaluation survey.

TABLE II
Mean Importance and Satisfaction Ratings

| OLE Element/Function | Importance | Satisfaction |
|---|---|---|
| 9. Accessing Unit Guides/unit information | 6.32 (1.11) | 5.19 (1.52) |
| 10. Accessing lecture notes/tutorial notes/lab notes | 6.51 (1.02) | 5.01 (1.58) |
| 11. Contacting your lecturer via internal unit messaging | 5.63 (1.58) | 4.63 (1.73) |
| 12. Contacting other students via internal unit messaging | 4.73 (1.78) | 4.60 (1.68) |
| 13. Using calendar | 3.08 (1.83) | 3.94 (1.78) |
| 14. Interacting with learning resources | 5.62 (1.40) | 4.68 (1.49) |
| 15. Contributing to discussions | 5.08 (1.64) | 4.82 (1.61) |
| 16. Reading contributions to discussions | 5.62 (1.46) | 5.05 (1.61) |
| 17. Using chat and/or whiteboard | 3.59 (1.90) | 3.70 (1.73) |
| 18. Working collaboratively in a group | 4.67 (1.88) | 4.00 (1.75) |
| 19. Completing quizzes/self tests | 5.36 (1.76) | 4.68 (1.75) |
| 20. Submitting assignments | 6.30 (1.34) | 4.58 (1.91) |
| 21. Receiving feedback on assignments | 6.36 (1.19) | 3.86 (1.90) |
| 22. Viewing my marks | 6.42 (1.12) | 4.27 (2.01) |
| 23. Reviewing unit progress | 5.96 (1.34) | 4.17 (1.76) |

### C. Results by Broad Discipline Area

At Deakin University, the academic faculties are broadly organised around discipline groupings as indicated in Table I (i.e., Business and Law, Science and Technology, etc.) In this study, the enrolled faculty reported by student respondents has been used as an indicator of their discipline area of study. The method of equating home faculty with discipline area is noted in the literature [22], but the limitations of this potentially 'crude proxy' are acknowledged [23].

A method for visualising the difference between the importance and satisfaction mean ratings between discipline groupings was developed. Using a two-dimensional grid, importance and satisfaction rating pairs for a survey item can be plotted as a point, with the importance rating as the vertical coordinate and the satisfaction rating as the horizontal coordinate. Here, the overall mean importance and satisfaction rating pair for a particular OLE element is plotted as a 'centre point', and for each of the five discipline groupings, the mean importance and satisfaction rating pair for the same OLE element for that discipline sub-group is plotted as the end of a line radiating from the centre point. This results in a star/spider-shaped figure (see Fig. 1 and Fig. 2) that visualises how the mean importance and satisfaction ratings vary between the discipline groupings in the student

respondent population. Attempting to plot this information for all 15 OLE elements for all five discipline areas results in a complicated chart, so for the sake of clarity, the 15 OLE elements have been divided into two groups and plotted in Fig.1 and Fig. 2 such that there is minimal overlap in the presentation of the star figures. In Fig. 1 and Fig. 2, each star figure is labelled with the number that corresponds to the OLE element given in Table II, and each of the lines radiating from the centre of the star figures has been labelled with a letter to indicate which discipline/faculty grouping it represents according to the following legend:

- A – Arts;
- B – Business and Law;
- E – Education;
- H – Health and Behavioural Sciences; and
- S – Science and Technology.

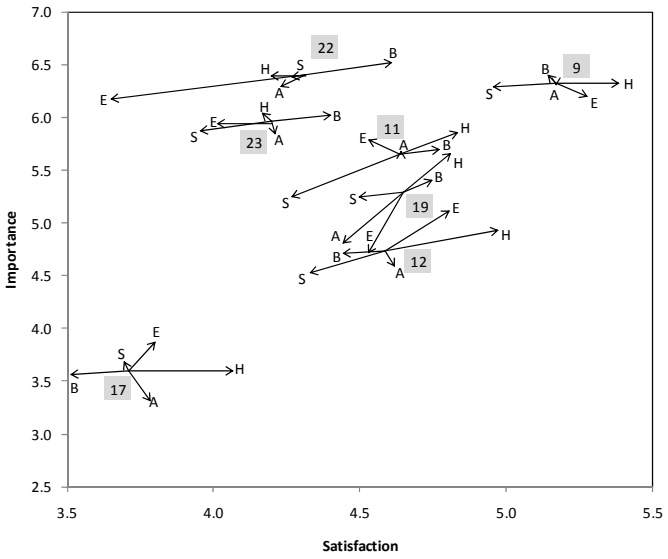


Fig. 1 Importance and satisfaction – Faculty comparison (1)

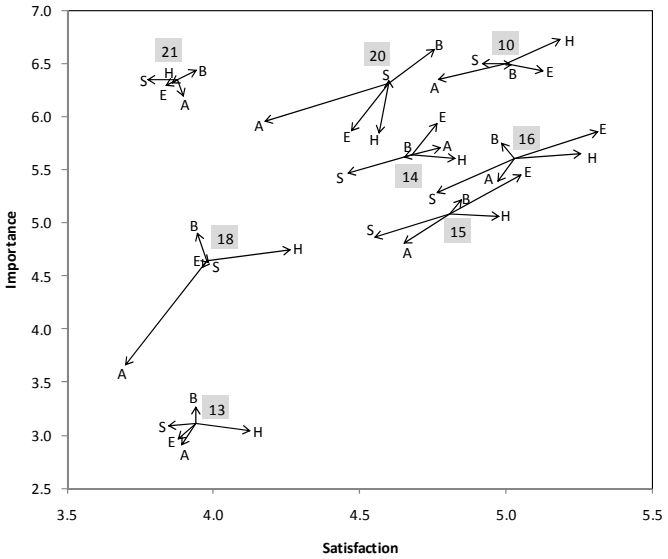


Fig. 2 Importance and satisfaction – Faculty comparison (2)

For each OLE element, a test for the equality of mean ratings of importance and satisfaction was performed to identify any significant differences in mean ratings between discipline areas. Where Levene's test for homogeneity of variance was successful, an analysis of variance (ANOVA) comparison of mean ratings was performed. Where the variance of the ratings between discipline groups was significantly different, Welch's test for equality of means was performed. Table III presents a summary of the equality of mean ratings tests, using the same OLE element numbering given in Table II, and it indicates the presence of many significant differences between (at least two) discipline areas in the mean rating of OLE elements at the $p < 0.01$ level.

TABLE III
COMPARISONS OF EQUALITY OF MEAN RATINGS BETWEEN DISCIPLINES

| OLE element | Importance | Satisfaction |
|---|---|---|
| 9 | ($F_{4,884} = 1.93$, $p > 0.103$) | ($F_{2209} = 4.61$, $p < 0.002$) |
| 10 | ($F_{4,864} = 9.78$, $p < 9.7\times10^{-8}$) | ($F_{2164} = 3.91$, $p \approx 0.01$) |
| 11 | ($F_{4,849} = 8.31$, $p < 1.4\times10^{-6}$) | ($F_{4,839} = 7.27$, $p < 9.3\times10^{-6}$) |
| 12 | ($F_{2005} = 5.77$, $p < 1.3\times10^{-4}$) | ($F_{2005} = 9.43$, $p < 1.6\times10^{-7}$) |
| 13 | ($F_{1677} = 2.28$, $p > 0.057$) | ($F_{1677} = 1.18$, $p > 0.317$) |
| 14 | ($F_{4,850} = 5.33$, $p < 3.1\times10^{-4}$) | ($F_{2062} = 3.77$, $p \approx 0.01$) |
| 15 | ($F_{4,831} = 8.72$, $p < 6.9\times10^{-7}$) | ($F_{2059} = 5.94$, $p < 9.5\times10^{-5}$) |
| 16 | ($F_{4,851} = 9.65$, $p < 1.3\times10^{-7}$) | ($F_{2107} = 7.00$, $p < 1.4\times10^{-5}$) |
| 17 | ($F_{1485} = 2.23$, $p > 0.063$) | ($F_{1485} = 4.78$, $p < 7.9\times10^{-4}$) |
| 18 | ($F_{1567} = 16.2$, $p < 5.1\times10^{-13}$) | ($F_{1567} = 2.93$, $p > 0.019$) |
| 19 | ($F_{4,528} = 9.99$, $p < 8.5\times10^{-8}$) | ($F_{1625} = 2.74$, $p > 0.026$) |
| 20 | ($F_{4,492} = 25.8$, $p < 2.0\times10^{-19}$) | ($F_{1743} = 4.17$, $p < 0.003$) |
| 21 | ($F_{4,615} = 2.28$, $p > 0.059$) | ($F_{4,629} = 0.60$, $p > 0.660$) |
| 22 | ($F_{4,707} = 4.60$, $p < 0.002$) | ($F_{4,731} = 10.5$, $p < 2.8\times10^{-8}$) |
| 23 | ($F_{4,728} = 1.67$, $p > 0.155$) | ($F_{1921} = 5.13$, $p < 4.2\times10^{-4}$) |

The five-way, pair-wise discipline comparison of mean ratings is complex. For each OLE element, post-hoc pair-wise comparisons between the mean ratings for importance and satisfaction for discipline groups were performed. Where the variance of the ratings between discipline groups was not significantly different, Scheffé's post-hoc test was used. Where the variance of the ratings between discipline groups was significantly different, Tamhane's T2 post-hoc test was used. Using the same legend as Fig. 1, Table IV indicates (with an 'x') for each OLE element where the pair-wise mean ratings of importance were significantly different between discipline area pairs at the $p < 0.01$ level.

For those pair-wise comparisons in Table IV that were significant, the significance values ranged from $p < 0.01$ (mean rating of OLE element 22 between B and E) to $p < 8.4\times10^{-13}$ (mean rating of OLE element 18 between A and B). Table V provides the same indication for pair-wise satisfaction ratings. For those pair-wise comparisons in Table V that were significant, the significance values ranged from $p < 0.005$ (mean rating of OLE element 15 between E and S) to $p < 2.9\times10^{-8}$ (mean rating of OLE element 22 between B and E).

TABLE IV
PAIR-WISE SIGNIFICANT DIFFERENCES IN IMPORTANCE BY DISCIPLINE

| | Discipline / Faculty pairs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | | | | B | | | E | | H |
| OLE element | B | E | H | S | E | H | S | H | S | S |
| 9 | | | | | | | | | | |
| 10 | | | x | | | x | | x | | x |
| 11 | | | | x | | | x | | x | x |
| 12 | | | | | | | | | x | |
| 13 | | | | | | | | | | |
| 14 | | | | | x | | | | x | |
| 15 | x | x | | | | | x | | x | |
| 16 | x | x | | | | | x | | x | |
| 17 | | | | | | | | | | |
| 18 | x | x | x | x | | | | | | |
| 19 | x | | x | | x | | | x | | |
| 20 | x | | | | x | x | x | | | x |
| 21 | | | | | | | | | | |
| 22 | | | | | x | | | | | |
| 23 | | | | | | | | | | |

TABLE V
PAIR-WISE SIGNIFICANT DIFFERENCES IN SATISFACTION BY DISCIPLINE

| | Discipline / Faculty pairs | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | | | | B | | | E | | H |
| OLE element | B | E | H | S | E | H | S | H | S | S |
| 9 | | | | | | | | | | x |
| 10 | | | | | | | | | | |
| 11 | | | | | | | x | | | x |
| 12 | | | | | | x | | | | x |
| 13 | | | | | | | | | | |
| 14 | | | | | | | | | | |
| 15 | | | | | | | | | x | |
| 16 | | | | | | | | | x | x |
| 17 | | | | | | x | | | | |
| 18 | | | | | | | | | | |
| 19 | | | | | | | | | | |
| 20 | x | | | | | | | | | |
| 21 | | | | | | | | | | |
| 22 | | | | | x | | | | x | |
| 23 | | | | | | | x | | | |

## VI. DISCUSSION

### A. General Observations

Temporarily setting aside discipline differences and considering the centre points of the stars in Fig. 1 and Fig. 2, OLE elements that students rated highly overall (importance and satisfaction) included accessing unit information, accessing lecture/tute/lab notes, interacting with unit learning resources, reading online discussions, contacting lecturers/tutors, and submitting assignments online. These elements could all be considered 'basic' OLE elements, and an institution should aspire/hope to get a satisfactory rating from students for these. There is also other evidence from the literature that these are the OLE functions that students most use and value highly [24]–[25]. Students gave the highest importance rating in combination with the lowest satisfaction rating overall to the following OLE elements: receiving feedback on assignments, viewing my marks and reviewing unit progress. These results are consistent with the value that students generally place on timely, quality feedback on their work, and their desire for more of the same [26]–[27]. These overall OLE ratings were as generally expected, and provide some face validation for the data.

Table VI presents a tally of the number of times that each discipline area produced the highest and lowest mean rating for importance and satisfaction across all 15 OLE elements included in the investigation.

TABLE VI
NUMBER OF HIGH AND LOW RATINGS BY DISCIPLINE AREA

| | Importance | | Satisfaction | |
|---|---|---|---|---|
| Faculty / Discipline area | High | Low | High | Low |
| Arts | 0 | 7 | 0 | 4 |
| Business and Law | 6 | 0 | 4 | 1 |
| Education | 5 | 3 | 2 | 1 |
| Health and Behavioural Sciences | 4 | 1 | 9 | 0 |
| Science and Technology | 0 | 4 | 0 | 9 |

For importance, neither Arts nor Science and Technology produced any high ratings, and Arts produced clearly the greatest number of low ratings. For satisfaction, neither Arts nor Science and Technology produced any high ratings, Health and Behavioural Sciences produced clearly the greatest number of high ratings and no low ratings, and Science and Technology produced clearly the greatest number of low ratings. Broadly speaking, the Arts and Science and Technology discipline areas reported the lowest importance and satisfaction ratings for the OLE, while the Health and Behavioural Sciences area was the most satisfied with the OLE. This latter finding is in broad agreement with that of a UK JISC research project which surveyed students from four different discipline areas and found that students from medical disciplines gave the highest importance rating to e-learning as part of their studies, while language students gave the lowest rating of importance to e-learning [14].

For a number of OLE elements, there were no significant differences in mean rating for importance and/or satisfaction, or the significant differences were limited to a single discipline pair-wise comparison. The following discussion will focus on the observed discipline differences that were more systematic.

### B. Importance and Satisfaction Ratings

While element 10 (accessing lecture notes/tutorial notes/lab notes) had the highest mean importance rating of all elements, it was rated significantly more important by students from Health and Behavioural Sciences than all other discipline areas. A UK JISC research project also found that OLEs were principally used for accessing course material and that medical students were most likely to use it for this function [14]. Students in the health disciplines commonly undertake clinical placements, and the ability to remotely access course materials while away from campus may contribute to the higher rating observed in this discipline area.

Element 11 (contacting your lecturer via internal unit messaging) was rated significantly less important by students from Science and Technology than all other discipline areas. Students in the science and technology disciplines commonly under laboratory work, necessitating additional contact with academic and technical staff, and this may reduce the need for communication with staff by other means.

The same pattern of importance ratings was observed for the two closely coupled OLE elements 15 (contributing to discussions) and 16 (reading contributions to discussions). Students from Science and Technology and Arts rated these elements as significantly less important than students from the Business and Education disciplines. A UK study found that online discussions featured least in physical science subjects, and suggested this may be due to the physical sciences being more likely to use individual task-based learning activities, rather than group work and/or discussion-based activities [4]. Others have suggested that the 'hard' disciplines place more emphasis on concepts, facts and principles, which need less 'discussion' [5]. While this research supports one half the ratings observed here, the same sources suggest that online discussions featured most in the humanities [4], and that the 'soft' disciplines would preferentially use online technologies that supported communication [5].

Element 18 (working collaboratively in a group) was rated significantly less important by students from Arts than all other discipline areas. While this result supports the findings here for elements 15 and 16, it also runs counter to the findings in the literature noted previously [4]–[5]. Although, it is observed that scholarship in the soft disciplines has a tradition of solitary activity and limited overlap between scholar's areas of interest [5], which may partially explain the result here.

Element 20 (submitting assignments) was rated significantly more important by students from Business than all other discipline areas. It is not clear what the source of this difference might be – though a focus on grades (and hence perhaps assignment submission) by business students is identified in the literature [28]–[30].

Compared to the observed significant differences in mean importance ratings in Table IV, there are fewer significant differences in mean satisfaction ratings in Table V, and those that are observed are less systematic than for importance ratings (i.e., the OLE element satisfaction rating for one discipline is not significantly different to all others). The greater number and more systematic nature of the differences in mean importance ratings may represent the 'real' underlying philosophical differences between the discipline areas. While the pragmatic reality of operating practically using a single institutional OLE system governed by a common set of globally applied operating policies may be represented by the more uniform mean satisfaction ratings.

### *C. Considerations/Limitations*

While discipline groups have their own distinctive characters, it is acknowledged that there is an element of demographic convenience in presuming distinct disciplinary boundaries. The use here of student enrolled faculty as a proxy for discipline area has been noted previously, and while academic faculty groupings at Deakin University are generally organised around allied discipline areas, the discipline demarcation is not universally rigid. It is noted that some subject areas effectively span traditional discipline boundaries, and that over time some disciplines have change significantly in character [5]. Likewise, the use of all types of information and communication technologies (ICTs) by the disciplines is not static and will evolve with developments in both technology and the discipline area. As well as differences, previous investigations have found significant areas of commonality in the adoption and use of ICTs across discipline areas [4], [14] – here a number of OLE elements where no significant difference by discipline was found in mean ratings for importance and/or satisfaction were also observed.

This investigation reports on student ratings of elements of an OLE. However, academic staff play a fundamental role in the use of online learning by students [31] – in a specific learning context, students can only 'use' those aspects of the OLE that staff make available to them. For students without ICT fluency, their experience of the OLE will depend on how well course designers and academic staff guide them in the use of the system [13].

## VII. Conclusion

Based on a large and representative sample of students enrolled at Deakin University, a number of significant differences were observed between broad discipline areas in the mean student ratings of importance and satisfaction with elements of an OLE. The most systematic differences were observed in the mean ratings of importance, suggesting that these are the 'real', or at least espoused, differences between the discipline areas.

An interesting development at Deakin University since the time of the student DSO evaluation survey documented here was the merger of the faculties of Arts and Education in 2008. It was observed that students from Arts gave significantly lower mean importance ratings than students from Education did to three OLE elements – 15 (contributing to discussions), 16 (reading contributions to discussions) and 18 (working collaboratively in a group). Through the merger, these two broad discipline areas would have come under a single teaching and learning leadership team, a single administration system and a single ICT support team. While it is interesting to speculate on the sources of the differences in the pre-merger student ratings relating to online collaborative communication and cooperation, it would also be instructive to explore how the apparently diverging beliefs of the two student populations have been reconciled in the post-merger use of the OLE in the combined faculty.

This development highlights two important and urgent areas for further investigation regarding the use of the OLE at Deakin University. Firstly, following the reconfiguration of the academic faculties, the results reported here are in some respects now obsolete. In addition, since the time that the DSO evaluation survey reported here was conducted, DSO has expanded beyond being an internal tag for the LMS. DSO is now the Deakin University 'brand' for a portfolio of e-learning technologies. The status of the LMS has evolved from being the entirety of the OLE to effectively having an underpinning 'hygiene' role, with its presence and features being presumed and taken for granted, and providing a linking platform for the support of other value-adding e-learning

technologies. The University's teaching and learning plan countenances the addition of extra e-learning technologies under the DSO banner. On top of this, LMS vendor ownership changes and product development decisions mean that the current LMS will no longer be supported, and that Deakin has now commenced a process of moving to a new LMS platform. All of these developments mean that there is an urgent need to update the information presented here to form a new baseline in the understanding of student use of the OLE, and for the establishment of on-going, systematic monitoring of the OLE as the new LMS platform is implemented.

Secondly, as noted previously, the discipline make-up of the faculties is not completely homogenous – being composed of a number of separate (generally tightly) discipline-based schools. The relatively large number of overall respondents to the DSO evaluation survey, and the good match to the proportions of students by faculty in the entire student population, suggest that there would be statistically meaningful student samples for the individual schools that make up the academic faculties. There would likely be value in exploring the more fine-grained 'discipline differences' in the student perceptions of elements of the OLE that might exist within the academic faculties. Certainly, the finding here that elements of the institutional OLE are not universally perceived the same way by all students groups challenges the value of standard, one-size-fits-all institutional policies and templates relating to the use of the OLE.

## APPENDIX

**DSO student evaluation survey**

1: Gender [Male, Female]
2: Which of the following best describes your primary status as a student? [On-campus, Off-campus]
3: Which campus is the one you attend most? [List of Australian campuses, Overseas campus, None of these]
4: Your faculty? (select all that apply) [Arts, Business & Law, Education, Health & Behavioural Sciences, Science & Technology]
5: Your level of study? [Undergraduate, Postgraduate]
6: How many semesters have you used DSO? [This is my first semester, 2 semesters, 3 semesters, 4 or more semesters]
7: What is the main support resource you have used for DSO? [DSO Help web site, Deakin Learning Toolkit, Faculty Information and Research Section, Internal DSO Help link]
When using DSO, (a) how important do you find the following for studying your units and (b) how satisfied are you with DSO's contribution to your learning in the following areas? l=Low, 7=High.
8: How important is support for using DSO to you, and what is your level of satisfaction?
[Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
9: Accessing Unit Guides/unit information [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
10: Accessing lecture notes/tutorial notes/lab notes [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
11: Contacting your lecturer via internal unit messaging [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
12: Contacting other students via internal unit messaging [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
13: Using calendar [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
14: Interacting with learning resources [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
15: Contributing to discussions [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
16: Reading contributions to discussions [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
17: Using chat and/or whiteboard [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
18: Working collaboratively in a group [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
19: Completing quizzes/self tests [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
20: Submitting assignments [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
21: Receiving feedback on assignments [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
22: Viewing my marks [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
23: Reviewing unit progress [Importance: N/A, 1 - 7] [Satisfaction: N/A, 1 - 7]
Please rate the following questions where 1= strongly disagree, 5=strongly agree
24: The use of DSO enhanced my learning experience [Agree: 1 – 5]
25: I felt adequately supported by those teaching my units to use DSO effectively [Agree: 1 – 5]
26: I felt adequately supported technically to use DSO effectively [Agree: 1 – 5]
Any other comments? [Free text entry]

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