The learning-technology conundrum: Lecturers' perspectives

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Abstract

A challenge faced by the Chair of the Department of Marketing and Retail Management, an academic department within the University of South Africa, is to adopt and manage appropriate learning technologies to support the department's learning offerings and students. The conundrum that arises, and which this study attempts to answer, is which learning technologies are the most appropriate for the department to use. Although the university actively promotes certain learning technologies, these are not always adopted uniformly across departments. Furthermore, while some lecturers are averse to using any form of technology in their teaching activities, others may favour one learning technology over another, or may even adopt non-official learning technologies rather than those supported by the university. As the lecturer is key to the delivery of learning within the department, as well as to ensuring the success of any learning technology adopted by the department, it makes sense to understand the views of lecturers as to which learning technologies they see as being the most appropriate to use. Their views were obtained using the Delphi method, and analysed using Chi-square analysis. The findings suggest that a learning management system is considered by lecturers as the most appropriate technology to use.

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INTRODUCTION

A number of authors have written about the increasingly important role that technology plays in facilitating learning in higher education (Baltaci-Goktalay and Ocak 2006; Marginson 2006; Monsakul 2007; Rogers 2004; Turney, Robinson, Lee and Soutar 2009). In these and other articles on the use of technology in education, the types of technologies referred to are many and varied. They include, amongst others, learning management systems (Monsakul 2007), e-mail (Collis and Van der Wende 2002), compact discs (CDs) and digital video discs (DVDs) (Klassen 2001), mobile wireless technologies (Kim, Mims and Holmes 2006), video conferencing (Baltaci-Goktalay and Ocak 2006), social media (Hoffman 2009), as well as podcasting and instant messaging (Hamid, Chang and Kurnia 2009). The conundrum that many higher-education institutions face is which of these often competing and at times overlapping learning-facilitating technologies to adopt (Knight 2009).

The University of South Africa (Unisa), a distance-learning institution and one of the world's largest 'mega-universities' with a population of approximately 250 000 students (Altbach, Reisberg and Rumbley 2009), is no exception – it, too, faces the same conundrum. While Unisa as a whole has adopted a number of the above-mentioned technologies to facilitate learning, the available technologies are not always adopted uniformly throughout the various colleges and academic departments. The reason for this is that, even though Unisa may officially endorse a particular learning technology, it is ultimately the lecturers within a department who determine the extent and effectiveness of the technology's use, and their respective views on these various technologies may differ.

There may be some lecturers who are technologically challenged and who either shy away from or limit their use of technology solutions in their teaching activities. Other lecturers, however, might be more comfortable with certain technologies than with others, and this could result in the disparate use of technology to support learning. In addition, some of the more 'techno-literate' lecturers may adopt one or more technologies not directly supported by the institution, such as various social media, *Skype*, *MixIT*, web-based solutions outside of the control of the university, as well as bespoke solutions they may have developed themselves. Using additional non-official technologies places even more strain on students who have to come to terms with each new technology, in order to progress with their studies. The varying influences that lecturers have on the use of technologies to support learning is not unique to Unisa, and several authors have reported on this in their own respective contexts (Bakioglu and Hacifazlioglu 2007; Baltaci-Goktalay and Ocak 2006; Collis and Van der Wende 2002; Klassen 2001; Knipe and Lee 2002; Monsakul 2007). For example,

Bakioglu and Hacifazlioglu (2007) refer to the 'addiction or resistance … ' to technology amongst faculty, while Baltaci-Goktalay and Ocak (2006) similarly refer to faculty, some of whom 'will accept new ways to teach with technology while others resist'.

Thus, the conundrum facing the Chair of Departments (CoDs) of the various academic departments within Unisa is how to manage the (lecturers') use of learning technologies within their respective departments. The CoD of the Department of Marketing and Retail Management (DMRM), faced with this conundrum, decided to undertake research to better understand the views of lecturers within the DMRM, as to which learning technologies they felt were best to use to support the department's students. The research gave rise to this article. The rest of the article outlines how the views of the lecturers within the DMRM were determined in respect of the learning technologies they deemed most suitable to facilitate learning amongst students in the DMRM.

METHODOLOGY

The methodology used for this study is based on the Delphi method, which is an iterative questioning process that serves as a way of obtaining a collective view from individuals where there is little or no evidence about the topic under investigation and/or where opinion is important (Thangaratinam and Redman 2005). In total, 14 junior and senior lecturers were involved in the study. This represents all of the lecturers within the DMRM, except for the authors of this article who did not contribute to the input, but instead oversaw the research process.

It was felt that the iterative nature of the Delphi method would prove effective in ensuring that each lecturer (from junior to senior) had an opportunity to contribute to the overall decision making in selecting the most appropriate learning technologies for the DMRM to use. Not only does the Delphi method allow everyone an opportunity to contribute, but participants can also build on previous comments (namely their own as well as those of their colleagues). The iterative nature of the Delphi technique also gives participants the time and opportunity to think about their options and answers. This could have been achieved by means of a focus group, but it was thought likely that a) junior lecturers might have been intimidated by the senior lecturers, and b) less vocal lecturers might not have had a chance to contribute to the discussion.

The research process that was followed in the gathering of data can be outlined as follows:

- **Step 1**: Each of the DMRM lecturers participating in the research (excluding the authors) was initially asked to identify at least five learning technologies that they believed would be appropriate to improve the learning offerings of the department within the distance-learning context. At the same time, they were asked to identify the major challenges (opportunities and threats) of implementing these technologies, as well as to suggest what might be done to address any of the challenges identified in using the technology for learning within their work context.
- **Step 2**: The lecturers' responses were then combined into a single table, with common technologies and challenges listed only once in the table. In the case of similar technologies, lecturers who had proposed these, may have identified different challenges from those proposed by their colleagues. The above process thus ensured that a broader spectrum of challenges associated with each of the suggested technologies was identified. It should be mentioned, however, that several technologies were identified without any challenges having been highlighted for any of these technologies.
- **Step 3**: This single table was then re-sent to all the lecturers, asking them to 'fill the gaps', especially where no challenges had been identified or where they felt there may be some shortcomings or misunderstandings. They could add additional technologies not yet identified, if they so wished. Only one additional technology was added during Step 3. The iterative nature of the Delphi method, together with the fact that lecturers had, by Step 3, had an opportunity to mull over the research question, enabled them to identify several additional challenges that had not been identified in Step 1. Once again, the answers were synthesised into a single – but now expanded and more complete – table. This table is quite extensive and too long to serve as an attachment to this article. A shortened list, highlighting only the technologies without any additional explanation, is attached as Addendum A.
- **Step 4**: The next step involved listing the various technologies identified by the lecturers (25 in total) in the form of a checklist (without the accompanying explanations and challenges) and then asking the lecturers to identify their preferences for the ten most relevant technologies (i.e. they simply had to tick the ten technologies of their choice and not rank them). A frequency table was subsequently created and the ten most relevant technologies were then indicated.
- **Step 5**: Using this revised list of the ten most appropriate technologies, the lecturers were then asked to prioritise the list from 1 to ten, with 1 being the most appropriate and ten being the least appropriate. Once again, a new

list was developed based on the mean score for the priorities indicated for each technology, across all of the lecturers concerned. From this revised and prioritised list, the five most relevant learning technologies (from the viewpoint of the lecturers) were then identified. Table 1 outlines the findings from Steps 3 to 5. The five technologies were then brought together with the challenges that the lecturers had originally identified in Steps 1 to 3, for each of these technologies. This list (the five top technologies together with their respective challenges) is outlined in Addendum B.

- **Step 6**: Finally, the lecturers were asked to compare the five technologies with each other in a pairwise fashion. The purpose of every comparison was for the lecturer concerned to identify which of the two technologies was the most appropriate for learning in a distance-learning context. This exercise resulted in ten separate comparisons being generated by each of the 14 lecturers. In each pairwise comparison, the lecturers were asked to allocate a score of '1' to the technology they regarded as the most appropriate of the two, and '0' to the least appropriate technology. In the case where both technologies were considered equally appropriate, a score of '0' was allocated to both. This input was then transposed into a data table and analysed statistically using the Chi-square method. The purpose of the Chi-square analysis is to determine whether the observed frequencies (i.e. counts for the individual technologies selected by lecturers) differ markedly from what one would expect by chance (Anon. 2009). The results of the statistical analysis are outlined in the findings below (see Tables 2–3).

FINDINGS

The research findings can be divided into four main groups:

1. The initial list of 25 technologies identified by the lecturers, is outlined in Addendum A. A more complete list identifying the associated challenges of each technology, as suggested by lecturers, can be found at http://www.cbothma.co.za/ME/list_of_technologies.html
2. The subsequent top ten technologies identified from the initial list of 25 technologies, together with their respective rankings (as indicated by the lecturers) are outlined in Table 1.
3. The top five technologies (highlighted in bold in Table 1), together with the challenges that lecturers had identified for each of these technologies, are outlined in Addendum B.

4. The results of a statistical analysis using the Chi-square of the pairwise comparisons of the top five technologies undertaken by the lecturers. This resulted in a total of n(n-1)/2 = 10 comparisons for each lecturer (where n equals the number of variables, in this case 'technologies'). The results of this analysis are outlined in Tables 2 and 3.

The top ten learning technologies

Table 1 highlights the top ten learning technologies identified by the lecturers (i.e. distilled from the initial 25 technologies suggested by lecturers) and provides a mean ranking score for each technology, where a lower value represents a more appropriate technology. These rankings represent the outcome of Steps 4 and 5 in the research methodology.

Table 1: Ranking and weightings of the top ten learning technologies[1]

Overall rank	Proposed technology	Mean ranking[2]
1	**Learning management system**	**1.9**
2	**CD/DVD technologies**	**5.0**
3	**Email**	**5.6**
4	**Web-based learning sites[3]**	**5.7**
5	**Automated telephone self-help services[4]**	**5.7**
6	SMS/MMS	5.8
7	Satellite/video/teleconferencing	6.0
8	Online discussion classes	6.0
9	Webinars/podcasting	6.1
10	Cellular/mobile technology	7.2

1 The technologies in bold represent the five technologies selected for further analysis

2 Lower values = 'more appropriate', while higher values = 'less appropriate' technologies

3 It is not clear what lecturers envisaged this technology would include

4 This technology refers to those telephone services, which guide callers through a series of questions to find the most appropriate assistance (this could also include interactive voice response systems).

The table above highlights the fact that a learning management system (LMS) is viewed by lecturers as the most appropriate learning technology to use in the context of their teaching responsibilities. Although not confirmed statistically at this point, it appears that the mean ranking score for an LMS is significantly

different from the ranking scores achieved by each of the other nine technologies. The mean ranking score was calculated on the basis of the mean or average ranking that the lecturers gave to each technology, where 1=top or 'most appropriate' and 10=bottom or 'least appropriate'. The next eight technologies following the LMS were all similar in their mean ranking scores. The technology mentioned last (cellular/mobile technology) was not considered very appropriate at all, with a mean ranking score of 7.2, setting it apart from the other top ten technologies.

The top five learning technologies (highlighted in Table 1) are analysed further as part of Step 6 of the research methodology, with the findings presented in Tables 2 and 3. The question arises as to why technologies 6 to 9 were not included in the last part of the analysis (the pairwise comparisons). The reasons for not including these technologies are a) that the study being reported here had as its main aim the identification of the most appropriate learning technologies for the DMRM to use in support of its students (and was thus not concerned with the 'less appropriate' technologies), and b) that undertaking a pairwise evaluation of ten technologies would have resulted in lecturers having to consider 45 different combinations – an onerous task. The greater the number of comparisons, the less accurate the comparisons become, simply because respondents are lulled into making impulsive choices.

The most appropriate learning technology

In Step 6 of the research process, the study expanded on the previous steps by taking the top five technologies identified in Table 1, and asking lecturers to consider these five technologies in a pairwise fashion. A frequency count of all of the preferred technologies from each pairwise comparison was then captured in a contingency table and analysed using Chi-squared analysis. Tables 2 and 3 below highlight the results of this analysis. The purpose of this analysis was to target the most appropriate learning technologies that the DMRM can use to support its students. In Table 2, the variable names are represented as

- learning management systems (LMS)
- CD and/or DVD technologies (CD/DVD)
- email (EMAIL)
- web-based learning sites (WEB)
- automated telephone self-help services (AUTO/TEL).

Table 2: Descriptive statistics of the data obtained from the pairwise comparisons

	F	Mean	Std. deviation	Min	Max	Expected F	Observed F(0)	Observed F(1)	Residual
CD/DVD	52	.3654	.48624	0	1	26	33	19	-7.0
AUTO/TEL	52	.3846	.49125	0	1	26	32	20	-6.0
WEB	52	.4615	.50338	0	1	26	28	24	-2.0
EMAIL	52	.2500	.43724	0	1	26	39	13	-13.0
LMS	52	.7115	.45747	0	1	26	15	37	11.0

Analysed using SPSS

Table 3: Chi-square test statistics

	CD/DVD	AUTO/TEL	WEB	EMAIL	LMS
Chi-square (X^2_{calc})	3.769*	2.769*	0.308*	13.000*	9.308*
df	1	1	1	1	1
Asymptotic value	0.052	0.096	0.579	0.000	0.002

Analysed using SPSS

* Zero cells have frequencies less than 5. The minimum expected was 26.

The descriptive statistics in Table 2 reveal that there were 52 frequency counts (F) of either '0' or '1' for each of the five variables. The 52 is computed on the basis that there were 13 respondents who completed four pairwise comparisons for each of the variables; thus, 13 x 4 = 52. For each of these variables, the mean is calculated on the basis of the observed positive responses (depicted by 1s) divided by F (i.e. 52); thus, for variable LMS it is 37/52 = 0.7115. The standard deviation, on the other hand, is a measure of variability of the population from the mean. A value of 0.457, for example, suggests that 45.7 per cent of the observations can be found within one standard deviation of the mean – a relatively good percentage, suggesting a normal distribution for the observations.

The minimum and maximum values reflect the two possible options that respondents could choose from, where '1' = 'this variable is a more appropriate technology than the alternative' and '0' = 'the alternate technology is more appropriate than this one' or 'they are equally appropriate'. The expected F (26

for all five variables) suggests that it was expected that half of the responses would be 0s and the other half 1s.

The observed F(0) in Table 2 reflects the number of actual '0s' allocated by the lecturers for the variable in question, while the observed F(1) reflects the number of actual '1s' allocated. In the case of the LSM variable, for example, there were 15 '0s' and 37 '1s'. Finally, the residual represents the deviation of the observed F – either F(0) or F(1) – from the expected F (of 26). For LSM, for example, the residual is calculated as follows: 26 - 15 = 11. If the residual is a positive value, then this reflects a more appropriate technology (1s > 0s), while if the residual is negative this represents an indifferent or less appropriate technology (0s > 1s) (Schwab 2004).

In Table 3, df represents the degrees of freedom (i.e. 1) and at df(1), the critical Chi-square value (X^2_{crit}) is 3.84, corresponding to a p-value of 0.05 – this value was determined from a look-up table (Steyn, Smit, Du Toit and Strasheim 2003). Any calculated value (X^2_{calc}) above 3.84 (X^2_{crit}) suggests that the variable in question is significant. This is the case for two variables, namely LMS and EMAIL.

In Table 3, LMS stands out as the most appropriate learning technology of choice for lecturing staff in the DMRM. The LMS's Chi-square of 9.308 is significantly higher than the critical Chi-square value. Furthermore, the asymptotic value is less than p=0.05, indicating that this technology is significant from a statistical point of view, thus confirming the Chi-square value. This finding is supported by the residual value in Table 2.

While EMAIL's Chi-square is also statistically significant at 13.000, the sign of the residual value, however, gives an indication of the direction of the significance. It suggests that EMAIL is very definitely not the technology of choice for staff, reflected in a high Chi-square value of 13.000, but with a minus sign associated with the residual value corresponding to the '1s' (i.e. there were more '0s' than '1s').

Furthermore, the Chi-square statistics reflected in Table 3 also indicate that the final three of the top five proposed technologies, namely CD/DVD, AUTO/TEL and WEB, do not stand out as appropriate technologies to use. This is because their respective calculated Chi-square values do not exceed the critical Chi-square value (see Table 3). Furthermore, their respective residual values, as indicated in Table 2, are all negative, indicating that they were more often seen by the lecturers as the less appropriate technology to use of the various pairs considered. Nevertheless, the fact that CD/DVD, AUTO/TEL and WEB are amongst the top five technologies selected by the lecturers in the first place, suggests that these technologies may still be worth considering.

DISCUSSION

The above findings highlight the importance of LMS as the technology of choice, according to lecturers within the DMRM. This is not surprising, as Unisa already has an excellent proprietary LMS in place, called *myUnisa*. This powerful online tool is available to all registered students, and lecturers at Unisa will have had to use it from time to time in order to execute certain required tasks. They thus have some idea of the benefits of an LMS. However, the lecturers do not all actively use or support *myUnisa*, and thus it is surprising how positively they, as a whole, viewed an LMS. It seems they all realise that it is an important tool, even if some of them are reluctant or afraid to use it.

The fact that email was viewed as being the least appropriate of the five learning technologies was also surprising. It should be borne in mind that lecturers at Unisa are already using email extensively to communicate with students. In addition, email is also arguably one of the most effective communication tools for lecturers to use to communicate with students – especially in a distance-learning context. These factors suggest that email should appear very high on the lecturers' choices of learning technologies. Yet, this is not the case. A possible explanation might be that, while lecturers appreciate the importance of email (explaining why it made the top five list), the serious workload implications of the volume of daily emails being received from students make lecturers averse to email, because it represents work and an intrusion in their already busy day.

From the list of challenges identified by lecturers for CD and/or DVD (CD/DVD) technologies (see Addendum 2), it is suggested that the popularity of these media amongst lecturers is due to the frequent problems being experienced by Unisa in printing study materials timeously. Lecturers believe (rightly or wrongly) that this technology (and perhaps also other electronic media such as flash drives) could be used to deliver study material to students faster than is currently the case. Although the university generally does a good job in the timeous delivery of study materials to students it remains an area of concern, as there are always some students complaining that they are without study material or have received it late. Lecturers may see this technology as one way of solving the problem.

Furthermore, lecturers also highlighted the large number of telephone calls as a challenge they have to deal with, thus partly explaining the popularity of automated telephone self-help services (AUTO/TEL) as a top-five technology of choice. Their comments suggest that by using an automated self-help telephone service, they feel the technology could help reduce their workload, enabling them to focus on their core tasks of teaching and research.

Finally, as far as web-based learning sites (WEB) are concerned, it is not clear why this technology was selected as a top-five technology in the first instance. Lecturers' comments (see Addendum B) are mostly critical of the technology, which suggests that perhaps lecturers do not understand what this term actually means. It may be that one of the lecturers suggested this as a technology to consider, and the others supported this technology as being appropriate for the department, without fully understanding its application or impact. This points to one of the limitations discussed later in this article, namely that lecturers are not fully informed about all the technologies available to them and may be influenced by what appears to be a relevant technology, without completely understanding the technology concerned.

It also needs to be pointed out that there is arguably a serious overlap between an LMS and a web-based learning site, as suggested by lecturers. In fact, *myUnisa* is essentially a web-based learning system. This seems to suggest, therefore, that lecturers consider the Web (or the idea of 'online learning' as embodied in an LMS) to be the best technology to use.

A number of side issues were also identified in the study. These issues were distilled from the comments lecturers made in their annotations related to each learning technology. For example, lecturers expressed concern that adopting new learning technologies would overburden their existing workload. They were also concerned that they would have to learn to work with these new technologies – something which was a daunting problem for some of the lecturers who were struggling to keep up with the current technologies, systems and software. Some lecturers expressed concerns that in certain instances the students were more familiar with the learning technologies than the lecturers themselves, thus placing the lecturer at a disadvantage and serving as a barrier to effective teaching.

The comments made by lecturers point to the fact that the university was driving the adoption and implementation of new learning technologies within the broader university context, with lecturers being expected to comply and 'fit in'. This typical top-down approach does not engender the use of learning technologies amongst lecturers, who may feel that the technologies imposed by the university restrict their teaching activities or do not meet their needs.

Comments on study limitations

The question arises that if Unisa prescribes certain learning technologies for lecturers to use, whether there is any benefit in a study that attempts to determine the views of lecturers on the most appropriate learning technology to use. Are lecturers not simply obliged to use the learning technologies available to them? The answer lies in the reality that it is only with the support of the lecturers that

any learning technology will succeed. If they resist a technology that is thrust upon them (as some inevitably do), it is doubtful whether the technology will succeed. Furthermore, if lecturers adopt non-official technologies or support certain technologies but not others, then they may diffuse the broader efforts of the university in this regard. Thus, the views of lecturers are indeed important.

The second question that arises is whether lecturers are in a position to judge which learning technologies are most appropriate. Are they aware of the various and latest technologies available to them? If they do not know what the various technologies entail, how can they have an informed opinion? These are valid questions. Yet despite this lack of informed opinion, lecturers will still make decisions about the learning technologies at their disposal, even if it is to resist a particular technology or use one in favour of another. Thus, once again, their views do have relevance.

Furthermore, many of these technologies overlap. Lecturers may refer to learning management systems, web-based learning, online learning and other such phrases, as being uniquely different things. However, essentially they are all similar, if not the same. This semantic confusion played a part in the study being reported here, with lecturers identifying some technologies as uniquely different when, in fact, they are essentially the same. In some instances, this was overcome during the process of the authors consolidating the technologies identified by each lecturer, into a single table. Clearly, common technologies (albeit phrased or termed differently by a lecturer) were grouped together under a common heading. Nevertheless, some of the listed technologies still overlap: for example, Web-based learning and learning management systems, as well as webinars, *YouTube* and podcasts.

The final limitation is that the views of lecturers on the learning technology they regard as the most appropriate, are only part of a bigger picture. To fully appreciate the learning technology options available and the choices that have to be made, further research is necessary. This further research needs to focus on understanding the views of students, reflecting on past research about the topic (i.e. incorporate a literature survey), as well as on obtaining the views of experts in the field of learning technology products and applications.

CONCLUSIONS

Given the above-mentioned findings and discussion, the following conclusions can be made:

- **Lecturers in the DMRM support the adoption of an LMS as the most appropriate learning technology to use in their work context**

The overwhelming support for an LMS, as outlined in the findings, leads one to conclude that it is the most appropriate learning technology for the CoD to adopt within the DMRM. The overly positive attitude of lecturers to the LMS bodes well for the future, even if in reality lecturers' use of *myUnisa* is not optimal.

It is recommended that the CoD invest additional time and effort in promoting the use of *myUnisa* within the department. Perhaps incorporating a *myUnisa* training requirement into each lecturer's performance management agreement might be one way of encouraging lecturers to participate in the *myUnisa* training that the university makes available. It is thought that the training might help some lecturers overcome their lack of technological literacy (or perhaps their fear of technology), which is regarded as a major drawback to *myUnisa*'s effective adoption by these lecturers. The CoD should furthermore stress that the LMS be seen by lecturers as a tool to reduce their workload, not increase it.

The fact that the LMS came across so clearly in the study (on which this article is based) as the learning technology of choice, is particularly promising from a management perspective. It allows the CoD to focus on this technology primarily and not be distracted by attempting to implement a number of different learning technologies within the DMRM. The benefit of focusing solely on *myUnisa* is that the latter already incorporates many of the other learning technologies referred to by the lecturers, such as email, short messaging services (SMSes), blogs, discussion forums, etc.

- **Lecturers are reluctant to support email as a learning technology of choice**

Although email made the list of top-five technologies, the role of email as the main learning technology of choice is viewed circumspectly by lecturers, possibly because the technology is currently associated with increased workloads (i.e. more emails equal more work). However, the fact that a) email is already a core communication tool for lecturers, and b) it is an integral part of the LMS, suggests that the CoD can focus on other technologies instead. It is recommended that alternative ways be found to deal with the large number of emails being received daily. In this regard, it is further recommended that the *myUnisa* LMS be promoted as the primary source of contact with students. If students realise that their answers lie on the LMS, they will eventually use email less and less (although it is doubtful whether email will ever be replaced by *myUnisa* as the primary communication channel with students). Use could also be made

of frequently asked questions (FAQs) and a centralised email facility through which academic enquiries are channelled. In addition, administrative enquiries can quickly be referred to the appropriate administrative persons, if channelled through this central point. Finally, additional assistants could be appointed to help handle the email load.

- **Lecturers support the adoption of automated self-help telephone services**

It is concluded that the interest amongst DMRM lecturers in adopting this technology stems from the large number of telephone calls lecturers have to deal with. They feel that by using an automated self-help telephone service, this technology could help reduce their workload, enabling them to focus on their core tasks of teaching and research. However, it will be difficult to implement an individualised interactive telephone response system. Instead, it is proposed that the CoD institute a centralised departmental telephone number, manned by properly trained assistants who can handle many of the calls lecturers would otherwise have to take. These assistants could not only answer many of the common queries, but could also redirect calls to more appropriate persons (especially in the case of administrative queries). Lecturers would then only have to deal with very specific callers whom only they could assist (i.e. in respect of module- and academic-specific queries).

- **Lecturers see CD/DVD technologies as a solution to the printing problems experienced with study material at Unisa**

Using CD/DVD technology to solve the abovementioned problem is feasible, but has its limitations. It simply shifts the pressure from printing hard copy study material to producing CD/DVDs that will be used to deliver the study material to students. In addition, this is an issue that lies beyond the control of the DMRM – it is a broader Unisa matter. CD/DVDs would also need to be dispatched via the postal system and would therefore encounter similar problems as those currently experienced with the sending of hard copy study material. It should be noted that not all students have access to computers with which to read the CDs/DVDs.

Instead of using this technology as an alternative source for study materials, it is more advisable to use it as a source of additional supporting multimedia material. For example, the DMRM is currently using CD/DVDs as a way of delivering a general 'introduction to marketing' video and a 'how to prepare for exams' video to the DMRM students. This material results in computer files that are too large to distribute on *myUnisa* and that need to be sent on a medium such as a CD, DVD or flash drive.

In conclusion, the study being reported here highlighted the LMS as the technology of choice from the point for view of lecturers. At the same time, the study has also identified other technologies and additional issues related to the adoption of these technologies that need consideration. The next step is to expand this research to include the views of students as to their preferred choice of learning technologies. In addition, it is suggested that a literature review be undertaken as to which learning technologies are best, as well as a survey of experts in this field. The findings from this further research should provide a more holistic understanding of the possible role of learning technology in the DMRM's teaching activities.

REFERENCES

Altbach, P. G., L. Reisberg and L. E. Rumbley. 2009. Trends in global higher education: Tracking an academic revolution. A report prepared for the UNESCO 2009 World Conference on Higher Education, 5–8 July, Paris, France.

Anon. 2009. Chi-square test. StatPac. Available at: http://www.statpac.com/statistics-calculator/counts.htm. Accessed on 13 April 2009.

Bakioglu, A. and O. Hacifazlioglu. 2007. Lecturers' and students' attitudes towards the use of technology in lectures: No taboos, more thinking. Paper presented at the ISATT 2007 Conference, 5–9 July, in Ontario, Canada.

Baltaci-Goktalay, S. and M. A. Ocak. 2006. Faculty adoption of online technology in higher education. *Turkish Online Journal of Educational Technology in Higher Education* 6 (4): first and last page of article.

Collis, B. and M. C. van der Wende. 2002. *Models of technology and change in higher education: An international comparative survey on the current and future use of ICT in higher education*. Enschede, the Netherlands: Center for Higher Education Policy Studies.

Hamid, S., S. Chang and S. Kurnia. 2009. Identifying the use of online social networking in higher education. Paper presented at the ASCILITE 2009 Conference, 6–9 December, in Auckland, New Zealand.

Hoffman, E. S. 2009. Evaluating social networking tools for distance learning. Paper presented at the Technology, Colleges and Community (TCC) Worldwide Online Conference, 14–16 April, at the University of Hawaii, Hawaii, United States of America.

Kim, S. H., C. Mims and K. P. Holmes. 2006. An introduction to current trends and benefits of moile wireless technology use in higher education. *AACE Journal* 14 (1): 77–100.

Klassen, J. 2001. Pedagogical support for use of information technology in teaching. *Informing Science* (June): 301–309.

Knight, S. 2009. Effective practice in a digital age: A guide to technology-enhanced learning and teaching. Joint Information Systems Committee report, Bristol, United Kingdom. Available at: http://www.jisc.ac.uk/media/documents/publications/effectivepracticedigitalage.pdf. Accessed on 12 April 2009.

Knipe, D. and M. Lee. 2002. The quality of teaching and learning via video conferencing. *British Journal of Educational Technology* 33 (3): 301–311.

Marginson, S. 2006. Dynamics of national and global competition in higher education. *Journal of Higher Education* 52: 1–39.

Monsakul, J. 2007. Learning management systems in higher education: A review from faculty perspective. Paper presented at the Fourth International Conference on eLearning for Knowledge-Based Society, 18–19 November, in Bangkok, Thailand.

Rogers, G. 2004. History, learning technology and student achievement: Making the difference? *Active Learning in Higher Education* 5 (2): 232–247.

Schwab, J. 2004. Social work statistics: Chi-square test of independence. Class notes. School of Social Work, University of Texas, Texas, United States of America.

Steyn, A. G. W., C. F. Smit, S. H. C. du Toit and C. Strasheim. 2003. *Modern statistics in practice*. Pretoria: Van Schaik.

Thangaratinam, S. and C. W. E. Redman. 2005. The Delphi technique. *The Obstetrician & Gynaecologist* 7: 120–125.

Turney, C. S. M., D. Robinson, M. Lee and A. Soutar. 2009. Using technology to direct learning in higher education: The way forward? *Active Learning in Higher Education* 10 (1): 71–83.

ADDENDUM A

	Proposed technologies
1	SMS/MMS (short messaging service/multimedia messaging service)*
2	Cellular technology (non-SMS) – e.g. wireless application protocol (WAP)/ mobile web applications
3	Personal digital assistant (personal digital assistants (PDAs) – similar to smart phones but without cellular connectivity)
4	CDs and DVDs
5	Learning management system (LMS) (e.g. *myUnisa*)
6	Social networking services (such as *Facebook*, *Twitter*, etc.)
7	Automated telephone self-help service (e.g. “If you want ... then press #1”, etc.)

8	Use of webinars/podcasting (short learning videos that are delivered to students via iPod, smart-/multimedia phones, or online)
9	*YouTube* (an online video delivery service that can also be viewed on some cell phones)
10	Internet/WWW (websites used to support module information activities, frequently-asked questions (FAQs), simple assessments, multiple-choice questions, etc.)
11	Satellite and video conferencing (teleconferencing)
12	Campus radio
13	National radio
14	Blogs (by lecturers)
15	Email (interactive communication between lecturer and student)
16	Chat or discussion forums (involving student-to-student and lecturer-to-lecturer communications)
17	Computer simulation and educational gaming (online and offline – CD/DVD-based)
18	Departmental software solutions (bespoke programmes to assist lecturers in helping students)
19	Interactive TV (e.g. DStv)
20	Online teaching (online discussion classes)
21	Keyword search tools
22	E-newsletter/e-magazines (run by lecturers for students)
23	Electronic provision of study materials (e.g. on flash drives)
24	Automated assessment
25	Webcams to support teaching and communications

* Short messaging service is sometimes called simple messaging service

ADDENDUM B

Overall rank	Proposed technology	Challenges (opportunities and threats) identified
1	Learning management system	• Costly to develop from a university's perspective • Time-consuming to maintain from a lecturer's perspective (requires a lot of involvement) • Incorporates a number of sub-technologies (e.g. blogs, wikis, email, SMS, discussion forum, etc.) • Useful to keep occasional and/or intensive contact with students • Unisa already has *myUnisa* in place • One-stop learning environment for students • Creates expectations on the part of students that may be difficult to meet • LMS not suitable for all learning tasks • If the LMS is badly designed, this could be a stumbling block • Available 24/7 for the student • Central point for communicating quickly with students • Not all students have access to LMS • Can be self-help or interactive • Facilitates collaborative learning (student-lecturer and student-student) • An efficient system • It can be used to support learning or as a main source of learning • Saves time – it is efficient • Learning can be managed
2	CD/DVD tech nologies	• Can solve the printing problems being experienced by Unisa • Not real-time interactive • Time-consuming and costly to create • Time-consuming to send out • Relies on physical distribution • Pirating may be a problem • Production has to be really good for the DVD to look good • Outdated technology • Student still requires a computer (not available to all students) • Make DVDs available to tutors to use (incorporating study material) • Can incorporate extensive audio-visual material and a much wider range of information than other media • Large storage capacity – good for sending bulk materials • Flash drives are perhaps a better option (physically smaller with bigger storage capacity) • Can be used for subject-specific support material (i.e. an add-on)

3	Email	• Students do not access their emails regularly • Set fixed days to send regular emails on • Creates an overload for the lecturer • Students expect immediate replies • Limited to the amount of data that can be sent • Not all students have email • A powerful communication tool
4	Web-based learning sites	• Speedy access to study materials • Not all students have access to the Internet/Web – netbooks? • Lack of broadband in SA • Lack of knowledge amongst lecturers • Will need to be used together with other technologies (blended learning) • Unisa needs to investigate ways of enabling students to get access to computers and the Internet
5	Automated telephone self-help services	• Can be used as a self-help service • Channels students to appropriate person, in order to help him/her • Can take a lot of work off the lecturers' shoulders • Should be provided by third-party department in the broader Unisa context (too many options are likely to be a problem, though) • Staff must be properly trained to handle queries • System must be equipped to handle volumes • It would help to reallocate administrative burden to appropriate person • Could use a fax-on-demand system to deliver low-volume tutorial material, etc.