

Choosing ICT? A segmentation analysis of students' preferences for hybrid study mode



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Students' acceptance and use of ICT-based learning needs to be understood in terms of their preferences for alternatives such as face-to-face (FtF) or print-based learning. This paper reports on an investigation of students' preferences for hybrid study modes. Cluster analysis was used to identify segments of students that had distinctive preferences for combinations of FtF, print and web-based study modes. Five segments were identified. These segments were distinguishable on some demographic and situational characteristics. The size and nature of the segments have implications for the hybrid modes offered by universities and the extent to which students' may embrace the ICT-based innovations designed by educators.

Keywords: preferences, study modes, segmentation, hybrid modes

Introduction

As educators and innovators, many of us are committed to using and developing new teaching methods and tools using ICT. Undoubtedly, ICT has the potential to provide choice for learners, cater for student diversity, and stimulate and engage students. However, despite our best intentions and efforts, and our beliefs about their value, important questions arise about students' acceptance and use of the ICT based innovations that we develop – particularly beyond their novelty or trial stage.

ICT-based innovations are offered as alternatives or supplements to existing ways students have of engaging in their learning. These alternatives, for conventional on-campus students, include FtF classes and 'technologies' such as printed notes, videos or CDs and DVDs. This paper contends that students' attitudes towards, and use, of ICT need to be understood in terms of their preferences for alternative forms of delivery. Further, students are likely to differ in their preferences, and consequently, their willingness to embrace ICT-based learning opportunities. Consequently, the purpose of the research was to examine students' preferences for combinations of study modes, and investigate the heterogeneity of their preferences.

Literature review

Universities worldwide are investing in ICT for the delivery of their educational programs. ICT (as online, web-based or E-learning) is used to supplement, enhance or replace conventional delivery. For on-campus study, the conventional mode is FtF. For distance education, in Australia, the conventional mode has included print combined with other stand-alone technologies. While many studies have investigated students' preferences for or attitudes towards ICT and online learning, fewer have compared students' preferences for different 'study' modes. Examples of the latter type of studies include those by Brown and Liedholm (2004), Garland and Noyes (2005) and Bruce, Dowd, Eastburn and D'Arcy (2005). Generally, these studies have investigated students' preferences in the context of particular applications within single subjects. Few have investigated students' general preferences, across their full program or course.

Study mode refers to the broad means by which educational programs are delivered to students (Hagel and Shaw 2006). In Australia, three archetypal modes can be identified: FtF, print-based and online. However, students are increasingly likely to experience hybrid or mixed modes. That is, their educational programs are delivered by some combination of classroom attendance, text and printed materials and online learning. An expanding literature exists about the desirability or value of hybrid modes that combine or blend FtF with online learning (Simpson 2006; Brown and Liedholm 2004; Kerres and de Wit 2003). However, there has been little investigation of how students may prefer to combine study modes to form their own hybrid experience. Further, while prior investigations into study mode preferences have reported differences based on student characteristics and situational factors (such as age, gender, attitudes towards ICT, prior experience or learning styles), these differences have not been explored in the context of preferences for hybrid courses (e.g., Simpson 2006; Rovai and Jordan 2005; Beyth-Marom, Chajut,

Roccas and Sagiv 2003). However, the findings on possible demographic and situational differences suggest there may be considerable heterogeneity in student preferences for hybrid modes. Consequently, questions that arise for university managers and educators concern whether there are groups of students with common sets of preferences and whether these groups or ‘segments’ can be identified for the purposes of designing study mode combinations that appeal to particular student segments. In summary, the research reported in this paper seeks to investigate two main questions. Firstly, can segments based on students’ preferences for different hybrid modes be identified? Secondly, if identifiable, do any demographic or situational variables distinguish the membership of these segments?

Method

Data were collected using a questionnaire mailed to Bachelor of Commerce (B.Com.) students who were enrolled, internally, at an Australian university. These students could supplement classroom attendance with study guides, in printed form or downloaded from the web. Depending on the units in which they were enrolled, other learning materials were also available online, and students could participate in computer-mediated communication. Some students had experience of enrolling externally (i.e. distance learning) in a full unit of study. International students were generally limited to studying only two external units.

Students were questioned about their study mode preferences and demographic and situational characteristics. Study modes were conceptualised as three main types: FtF, print-based and web-based. “Print-based” was defined as “hard copy, postal delivery of learning materials”; and “web-based” was defined as “online delivery of learning materials”. Students were asked to rate the three study modes on a five-point scale with 1 = definitely do not prefer this option, and 5 = definitely do prefer this option.

Questionnaires were returned by 381 on-campus students. This represented a response rate of 27 per cent. General data coding, screening and missing data analyses were conducted using SPSS. The statistical techniques used for generating the results included hierarchical cluster analysis and crosstabulations.

Findings

The first research question asked about the segments for study mode preference. To identify segments, students’ ratings for each mode were clustered using “average linkage between groups”. This method uses Pearson’s product moment correlation as the similarity measure and was chosen to reflect the order of study modes by cluster members. In total, 363 cases were included in the cluster analysis after removing five cases with substantial missing data and 13 cases where respondents failed to distinguish between the three study modes in their ratings of them. From the remaining cases, five segments were identified. Table 1 presents a profile of the clusters in terms of frequency, percentage size and mean rating of each study mode.

Table 1: Cluster profiles on study mode preferences

Cluster	Frequency	Percentage	FtF <i>Mean</i>	Web-based <i>Mean</i>	Print-based <i>Mean</i>
1. F-W-P	191	52.6	4.8	2.5	2.3
2. F-P-W	112	30.9	4.7	2.0	4.2
3. W-P-F	26	7.2	2.6	4.4	4.0
4. W-F-P	23	6.3	4.0	4.3	2.5
5. P-W-F	11	3.0	2.6	3.2	4.5

F = ‘FtF’, W = ‘web-based’, P = ‘print-based’

The clusters in Table 1 are interpreted in terms of the pattern of the rankings of study modes rather than the absolute size of the means (Everitt, Landau and Leese 2001). Consequently, members of Cluster 1, for example, combined a high preference for FtF with a moderately low preference for the remaining two modes. Because of the order of the preference for each study mode (highest to lowest), Cluster 1 is labelled, “F-W-P”. Cluster 1 was the largest segment and represented 52.6 per cent of respondents.

Cluster 2, “F-P-W”, comprised 30.9 per cent of respondents. The preferences of Cluster 2 members were distinguishable from those of Cluster 1 in that they combined a high preference for both FtF and print-based study. The remaining three clusters combined accounted for 16.5 per cent of respondents. Of these, Cluster 3 members had an opposite profile to those of Cluster 1, combining a strong preference for both web and print-based study with a low to moderate preference for FtF. Cluster 4 members showed a strong

preference for both web-based and FtF study. Finally, Cluster 5 members were distinctive in that they distinguished the most between the three modes with a preference for print, web and FtF in that order.

The second research question asked about the demographic and situational variables that are associated with segment membership. Crosstabulations were used to profile the clusters on these variables. Table 2 provides a summary of the results of the crosstabulations. These results are discussed descriptively, only, due to the small size of cells for some segments on some variables.

As indicated, Clusters 1 and 2 appear to have very similar profiles on the variables examined, with the exception that members of Cluster 2 were less likely to be first-year students. Cluster 3 is distinguished by having the lowest proportion of students who studied full-time. This characteristic was consistent with other distinguishing features of this cluster: the lowest percentage of members who were 25 years or less, a high proportion in paid work and the lowest proportion working 15 hours or less per week. Not surprisingly, given their greater likelihood of attending part-time, this group also had the highest proportion of domestic students. (By contrast, international students generally attend full-time, to comply with visa requirements.) In summary, the preferences of this cluster for more independent studies by print or web-based modes are consistent with their demographic and situational characteristics.

Table 2: Description of clusters on demographic and situational characteristics

	Percentage				
	F-W-P	F-P-W	W-P-F	W-F-P	P-W-F
Gender: Male	39	40	39	52	73
Age: 25 yrs or less	85	84	77	100	82
Year level: First year	24	17	23	22	18
Residential status: Domestic	50	54	65	52	55
Work status: in paid work	57	57	62	65	55
Work hours: 15 or less per week	56	50	19	33	33
Parental status: have dependent children	8	5	12	13	0
Attendance: full-time	91	90	65	100	91

Cluster 4 members were unique in having a strong preference for FtF and web-based study. Data in Table 2 indicates that members of this cluster were more likely to be male than members of the first three clusters, were all full-time students and were all from the youngest age-group. Finally, members of Cluster 5 were most distinguishable from other clusters by the high percentage of male students and by parental status.

In summary, cluster membership was distinguishable on at least one demographic or situational characteristic. A notable feature of the data was that for three clusters (Clusters 2, 4 and 5) members distinguished substantially between print and web-based study. Notwithstanding the small size of two of these clusters, the results suggest that student tenure (i.e., year level) may influence students' likelihood of preferring to combine FtF with a more independent study mode – in this instance, print. Further, the findings suggest an association between age and gender and relative preferences for web and print-based study.

Discussion and conclusion

The conference theme invited us to consider how we provide students with choice within ICT learning environments. However, for our investment in ICT to pay off, we need to consider the likelihood that students will choose ICT, in preference to alternative modes, in the first place. Presumably, students enrol on-campus because they want a predominantly, face-to-face learning experience. However, increasingly students may experience hybrid or blended modes that complement or partially replace some of their face-to-face learning. Much of this development has been supply-driven. Consequently, this study sought to investigate students' preferences for hybrid modes by conducting a segmentation analysis.

The findings revealed five main segments that were distinguishable in the mix of modes preferred by members. However, the identification and profiling of the two largest segments indicated that conventional on-campus enrolled students retained a strong preference for face-to-face study, albeit in some combination with print or web-based study. The persistence of students' preferences for face-to-face study has been noted by others (e.g., Bruce et. al., 2005; Frederickson, Reed and Clifford 2005). Combined with the results of this current research, these studies suggest that we need to be cautious about both the extent and nature of the use of ICT which we design into learning environments.

Further, the segmentation analysis revealed that, rather than a mix of web-based and face-to-face, the second largest segment preferred a hybrid of, predominantly, face-to-face and print-based study. A distinguishing feature of these segment members was that they were less likely to be first-year students. This finding suggests that, as students become more experienced at university, they may seek some degree of flexibility or independence. Print has a high degree of time and place flexibility and supports learner independence (Beattie and James 1997). Again, this finding suggests caution about how ICT is used in a hybrid mode. We cannot assume that it provides greater flexibility for students than print-based study (Hagel and Shaw 2006).

Three smaller segments were identified where respondents had a moderate to strong preference for web-based study, used in some combination with face-to-face and print-based study. These segments were small. No demographic and situational factors were associated, consistently, with membership of these segments. Clearly, further research is needed to unpack the benefits of each mode as perceived by students, to understand how students' preferences for these benefits may influence the hybrid they prefer, and to understand how individual differences influence perceptions of these benefits.

Some limitations of the research are acknowledged, importantly, that the findings pertain to a particular cohort of students at one university, and that the use of ICT has continued to evolve in both richness and reach since the data was gathered. However, it is important that we inquire into students' experience of and preferences for hybrid study modes, and the appeal and value of ICT within these.

References

- Beattie, K. & James, R. (1997). Flexible coursework delivery to Australian postgraduates: how effective is the teaching and learning. *Higher Education*, 33(2), 177-194.
- Beyth-Marom, R., Chajut, E., Roccas S. & Sagiv, L. (2003). Internet-assisted versus traditional distance learning environments: factors affecting students' preferences. *Computers & Education*, 41(1), 65-76.
- Brown, B. W. & Liedholm, C. E. (2004). Student preferences in using online learning resources. *Social Science Computing Review*, 22(4), 479-492.
- Bruce, B. C., Dowd, H., Eastburn, D. M. & D'Arcy, C. J. (2005). Plants, pathogens, and people: Extending the classroom to the web. *Teachers College Record*, 107(8), 1730-1753.
- Everitt, B.S., Landau, B. & Leese, M. (2001). *Cluster Analysis*. London: Oxford University Press.
- Frederickson, N., Reed, P. & Clifford, V. (2005). Evaluating web-supported learning versus lecture-based teaching: Quantitative and qualitative perspectives. *Higher Education*, 50(4), 654-664.
- Garland, K. & Noyes, J. (2005). Attitudes and confidence towards computers and books as learning tools: a cross-sectional study of student cohorts. *British Journal of Educational Technology*, 36(1), 85-91.
- Hagel, P. & Shaw, R. N. (2006). Students' perceptions of study modes. *Distance Education*, 27(3), 283-302.
- Kerres, M. & De Witt, C. (2003). A didactical framework for the design of blended learning arrangements. *Journal of Educational Media*, 28(2/3), 101-113.
- Rovai, A. P. & Jordan, J. D. (2005). Gender differences in online learning. *The Quarterly Review of Distance Education*, 6(1), 31-44.
- Simpson, N. (2006). Asynchronous access to conventional course delivery: a pilot project. *British Journal of Educational Technology*, 37(4) 527-537.

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