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# Should we still lecture or just post examination questions on the web? The nature of the shift towards pragmatism in undergraduate lecture attendance

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An empirical study was conducted to gain understanding about the motivations of undergraduate students in attending lectures. Students were highly heterogeneous regarding their reported lecture attendance motivations, with two segments representing prototypical extremes. The student group labelled 'idealists' in this study reported genuinely enjoying lectures, were mature-aged students with working experience and more frequent in the arts subjects surveyed. Students labelled 'pragmatics' in this study were most highly represented in the commerce subjects surveyed, were among the younger students, reported attending lectures to get the information they need to succeed in the subject and reported the lowest lecture attendance while achieving the highest grade-point average of the students in the study. Generally, as opposed to the findings of previous studies into reasons for lecture attendance in the 1970s, a shift towards pragmatism among students seems to have occurred and now defines the reality of the tertiary education environment.

## **Disciplines**

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## **Should we still lecture or just post examination questions on the web?**

The nature of the shift towards pragmatism in undergraduate lecture attendance

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### **Abstract**

An empirical study was conducted to gain understanding about the motivations of undergraduate students in attending lectures. Students were highly heterogeneous regarding their reported lecture attendance motivations, with two segments representing prototypical extremes. The student group labelled 'idealists' in this study reported genuinely enjoying lectures, were mature-aged students with working experience and more frequent in the arts subjects surveyed. Students labelled 'pragmatics' in this study were most highly represented in the commerce subjects surveyed, were among the younger students, reported attending lectures to get the information they need to succeed in the subject and reported the lowest lecture attendance while achieving the highest grade-point average of the students in the study. Generally, as opposed to the findings of previous studies into reasons for lecture attendance in the 1970s, a shift towards pragmatism among students seems to have occurred and now defines the reality of the tertiary education environment.

### **Gaps of knowledge**

The motivation for this study was to understand the reasons for, and patterns of, lecture attendance by students. An empirical study was conducted to gain more insight into what moves undergraduate students to attend lectures, to determine whether there are systematic differences between groups of students, and if so, what the nature of these differences might be. The research questions guiding the study included the following.

1. What motivates students to attend lectures?
2. Are there differences in lecture attendance across faculties?

3. Is there an association between student evaluation of the lecture and/or the lecturer, and the level of students' lecture attendance?
4. Is lecture attendance higher if the subject is compulsory?
5. Are personal student characteristics (age, nationality, family status, workforce status) associated with lecture attendance levels?
6. Are there groups of students – student segments as opposed to individuals - who differ with regard to their lecture attendance motivation?

## **Prior investigations**

What kind of lectures do students value? A broad range of student variables (cognitive, affective, motivational and behavioural) has been found to be related to effective student learning within, and as a result of, lectures (Perry, 1997). Seminal studies into lecturing that are still highly influential include the comprehensive review of the (then) literature on lecturing by Feldman (1976) that reported that the lecturing dimensions students ranked most highly were knowledge, stimulation of interest, clarity of explanation, enthusiasm and organisation. Bligh's (1972) now old but still highly influential meta-analysis of lecturing studies indicated that effective lectures offer the excitement of intellectual discovery; the presentation of challenging and provocative ideas, arguments and counter-arguments. Students in Sheffield's (1974) study pointed to the importance of the lecturer's clear love of their subject.

Later studies identified the importance of the dimensions organisation, clarity enthusiasm and interaction, for example, Centra (1990) and Isaacs (1992). Over the years, various studies have indicated the importance placed by students on the enthusiasm generated by the lecturer in making a lecture effective. These conclusions are supported by Abrami, Levantl and Perry (1982) who carried out a meta-analysis of twelve studies of expressiveness in lecturers and concluded that lecturer expressiveness influences students' attitude to both the lecturer and the subject. Enthusiasm was also the key to effective lectures for students in a study by Murray (1983). Further, expressive, enthusiastic teaching behaviours led to higher levels of student achievement and higher student ratings than did non-expressive and non-enthusiastic behaviours (Murray, 1997). McKeachie (1994) indicates that the lecturer's enthusiasm affects student motivation. The communication of enthusiasm for the topic by the teacher is a significant factor in effective lectures (Exley and Dennick, 2004; Browne and Race, 2002; Murphy, 1998; McKeachie, 1994; Ramsden, 1992; Brown and Atkins, 1988; Bligh, 1972).

The ability of the lecturer to make knowledge meaningful through introducing 'real world' and research applications into the lecture has been noted as important to students. Effective lectures generate understanding through human interest (Ogborn, 1977; Bliss and Ogborn, 1977); relate new knowledge to students' prior knowledge (Mayer, 1987); and place knowledge into a meaningful context (Gibbs, 1998). The effectiveness of lectures that value the excitement of intellectual discovery; the presentation of challenging and provocative ideas, arguments and counter-arguments, debates, problems, paradoxes and dilemmas is well documented by Bligh (1972) and supported by Isaacs (1992). Biggs (1999), Browne and Race (2002), Laurillard (1993), Ramsden (1992) and

many others refer to the importance of having students apply information) within the lecture.

Other reasons that students value lectures include the ability of the lecturer to make knowledge meaningful. Students in Sheffield's study (1974) stressed the importance of the lecturer conveying principles rather than details. Ogborn (1977) and Bliss and Ogborn (1977) illustrate the importance of generating understanding for lectures to be effective. Hunter and Tetley (1999) found enjoyment to be the main factor for attendance, followed by students' concerns the subject matter may be too difficult to understand without attending lectures.

Large class sizes may have a negative influence on student ratings of teacher effectiveness and skills (Gibbs *et al.*, 1996; Feldman, 1984) and on motivation levels (Crittenden, Norr and Bailly, 1975). It is possible that this might affect lecture attendance. Students in large classes have complained of losing interest because of long periods of inactivity, the distance from the lecturer, and lack of variety in lectures (Ward and Jenkins, 1992).

However, it should not be assumed that all students attend lectures because they provide effective learning experiences. Some students will attend lectures in order to acquire current information (Murphy, 1998; McKeachie, 1994; Exley and Dennick, 2004; Bligh, 1972). Students may attend lectures because the lecture makes it easier for them to understand the material within the subject, which is related to the lecturer's ability to clearly explain conceptually difficult material. Murphy (1998) indicates the importance students place on clear explanations. Land (1985) summarised lecturing studies over ten years and discovered achievement scores were higher for students attending lectures where explanations were clear and specific than for those attending lectures without this characteristic. Clarity within lectures correlated with student learning in studies by Solomon, Rosenberg and Bezdek (1964) and Feldman (1989). Land (1985) Bligh (1972) and Isaacs (1992) indicate the importance of the ability of lecturers to analyse and synthesise a great deal of complex material, make it simpler for students and explain it clearly. Students place high value on clarity and structure (Brown and Atkins, 1988). Ramsden (1992) also refers to the importance of the provision of structures and frameworks and this is supported by other writers, for example, Exley and Dennick (2004), Race (2004), and McKeachie (1994).

Assessment is the key to students' understanding of what knowledge is important in a subject (Biggs, 1999; Ramsden, 1992). Some students may attend lectures to discover information that will help them understand the nature, scope and standards required in their assessment tasks and to glean hints about topics that may appear in examination questions (Browne and Race, 2002).

Some studies into lecture attendance provide clues as to why students may not attend lectures. The pressure of competing assessment and learning tasks causing the need to work on assignments, and the inconvenient timing of lectures, and sometimes poor quality of lecturing and lecture content were noted as significant factors in students' lecture attendance (Hunter and Tetley, 1999). Inaudibility and incoherence; failure to pitch at an appropriate level, not emphasising key points, and poor visual support were

noted as reasons for non-attendance by students in studies by Brown and Daines (1981a 1981b) and Brown and Bakhtar (1983).

Disciplinary differences may exist, however these are not clear. Referring to various studies of lecturing Brown and Atkins (1988, p. 14) state 'whereas science students tend to see lectures as a way in to reading, for arts students lectures ideally follow reading and help them to interpret what they have read'. Brown and Daines (1981a) conclude that science students value logical and structured lectures more highly than arts students while arts students value insights and new perspectives. Nevertheless Erdle and Murray (1986) conclude from comparisons of lecturing effectiveness that the constituents of effective teaching do not vary markedly across the academic disciplines in arts, humanities, social sciences and natural sciences. Hunter and Tetley (1999) found significant differences in lecture attendance, both quantitatively and with regard to the motivations of attending and not attending.

## **Empirical study design**

The empirical study was conducted on a regional Australian university campus and followed a two-stage procedure. At the exploratory stage, a literature review, cartoon tests and short interviews were conducted with 100 randomly-selected students on campus to gain insight into the reasons and motivations for lecture attendance as well as possible covariates that might be influencing the attendance rate.

The information from this stage was used to develop a two-page questionnaire. The collection of student data took place in lectures across six faculties on campus with the permission of the respective lecturers. The student questionnaire included questions about the students (degree, age, nationality, grade point average, family status, work status), questions about the lecture in which they completed the survey (organisational unit at the university offering the subject, quality evaluation of the lecture and the lecturer, estimated difficulty level of the subject, motivations to attend lectures in this subject), questions on the general motivation to attend lectures and attendance rates both for this particular subject as well as for general lecture attendance

For logistical reasons, a random sample was not feasible and a convenience sample of lecturers willing to support the research project was approached for permission to survey their classes and to complete a questionnaire on their teaching. The questionnaire was completed on a voluntary basis. The final sample consisted of 623 students distributed over six faculties but only 612 indicated the organisational unit at the university offering the subject (Table 1).

----- Table 1 -----

The sample characteristics are as follows. 80 percent are single without children, 4 percent single with children, 8 percent partnered or married without children and 5 percent partnered or married with children (3 percent indicated the 'other' category). Australian and New Zealand students make up 74 percent of the sample, 17 percent from

Asian countries, 4 percent USA, 4 percent Europe and small proportions from South or Latin America or Africa. The largest age group is 18–20 year olds (43 percent), then 21–23 (36 percent), 24–26 (11 percent), 27–29 (3 percent) and 30 and over (7 percent). They have, on average worked for almost 5 years, have attended 80 percent of the lectures offered in the subject in which the survey was conducted and reach a 69 percent grade-point average.

## **Reasons for lecture attendance**

Students were provided with a list of reasons for attending lectures and asked to respond to these on a binary scale, stating only whether they apply to them or not. They were presented with the same list of reasons twice, once with respect to the subject in which the survey was conducted and once with regard to all of their subjects. It can be seen that there are only minor deviations from the subject-specific to the general evaluation of students (Table 2). The reasons that drive the majority of students to lectures are to find out what they are supposed to learn, not to miss important information, and to find out about assessment tasks. Enjoyment and derivation of enthusiasm from lectures seem to be rarely found reasons.

----- Table 2 -----

Students were also asked to rate the quality of the lecturer and the quality of the lecture as they perceived it on a percentage scale. On average, students rated the lecture quality at 62 percent and the lecturer quality at 66 percent, they attended nine out of eleven lectures held so far in the subject in which the survey was conducted and intend to attend an average of 13 lectures. This information has to be taken with care, as it seems that some faculties offer more than 13 lectures.

This descriptive information based on the entire sample of students provides insight into the strongest drivers of lecture attendance. Thus, providing information about what they have to learn as well as clarifying assessment tasks are measures which will – on average – attract most students to attend lectures. Knowing which factors are most important on average, however, does not allow any conclusions about which students are driven by which reasons. The procedure of averaging is likely to cover heterogeneity between individuals or like-minded groups of students thus not capturing the full picture. For this purpose two further investigations are undertaken: (1) the association between personal characteristics and reasons for lecture attendance is studied, and (2) the existence of groups of students who are like-minded with regard to the reasons of attending lectures is investigated.

## **The association of personal characteristics with lecture attendance**

A number of *a priori* reasons for differences in lecture attendance were investigated, based on the formulated research questions.

First, it was assumed that lecture attendance might vary across faculties (research question 2). The (self reported) attendance rate (this is the attendance rate independent of the subject in which the survey was conducted) differed between faculties, with science students attending most often, followed by arts, and commerce students having the lowest attendance rates (Analysis of variance  $p = < 0.001$ )

The attendance rate in the particular subject in which the survey was conducted resulted in science, health and behavioural sciences, and engineering students reporting the highest attendance rates and commerce reporting the lowest levels ( $p = < 0.001$ ).

Of course, these findings have to be interpreted with care, as the number of students is as low as five in the science area. These findings regarding disciplinary differences can consequently be taken as indicative only and hypothesis-generating for a follow-up study. They appear to support prior work by Brown and Atkins (1988) and Brown and Daines (1981a) who found significant differences in learning requirements by disciplines and Hunter and Tetley's (1999) results that significant differences in lecture attendance and reasons for lecture attendance exist between students of different faculties.

Both the reported quality of the lecture and the quality of the lecturer are significantly and positively correlated to lecture attendance (Pearson correlation  $p\text{-value} = < 0.01$ ) (research question 3), as is the age of the students (research question 5). While none of the prior work on the importance of lecturer characteristics has used one single global measure of evaluating the lecturer, these findings support results focusing on narrower definitions of lecturer style, as, for instance, the enthusiasm and interaction level (Centra, 1990; Isaacs, 1992; Abrami, Levanthal and Perry, 1982; Murray, 1983; 1997), relating new knowledge to students' prior knowledge (Mayer, 1987), and placing knowledge into a meaningful context (Gibbs, 1998).

Surprisingly, whether a subject is compulsory is not associated with the lecture attendance level (research question 4). Neither is the nationality of students (research question 5) Both led to insignificant ANOVA results based on sufficient sample sizes.

Whether students work or not is however significantly associated (ANOVA  $p\text{-value} = < 0.01$ ) with levels of attendance (research question 5). However, the direction of association is the opposite of what might be expected: working students attend on average 15 lectures per session while students who do not work attend on average only 12. The effect of full-time employment has, to the author's knowledge not been studied before. The finding that full-times students attend more lectures is very interesting and points in the direction of students' mind-sets possibly being more important than mere socio-demographic factors and characteristics of the lecture design and presentation.

### **Similarly minded student groups**

A cluster analysis was conducted to investigate research questions 6 and 7 (whether student segments exist or can be constructed who differ with regard to their motivations to attend lectures as well as additional, descriptive characteristics).

While the section on personal characteristics and their association with lecture attendance and beliefs about lecture attendance provided some valuable insight, it implicitly assumes



that the researcher is aware of all the potential reasons that could be causing different views on lecture attendance. The approach taken in this section is the precise opposite and thus represents a complementary analysis: the reason for segmenting the students in a data-driven manner is that prior assumptions about which covariates are influential may be incomplete or sub-optimal for the problem at hand. The aim is to determine if groups of students can be identified that differ only in their reasons for lecture attendance and to then (ex post) analyse in which way such groups differ.

Universities could use such information in very similar way to companies: they could identify which motivations they can best satisfy and communicate such strengths to particular student groups. For such groups, a university that best responds to their views on tertiary education will offer a unique selling proposition and thus have a competitive advantage in the tertiary education market. On the negative extreme side, the example would be “postbox universities” selling degrees to satisfy students needs to have a degree without learning. On the positive side, a university could target students who are interested in being able to translate theoretical knowledge into practical applications and thus make use of a student-pre selection process best matching their strengths. On the long term this would lead to providing the highest quality service to those students rather than having to satisfy the requirements of highly heterogeneous student groups which is likely to be impossible.

Eight student segments emerged as the most stable partitioning solution based on twelve investigated reasons for attending lectures. The stability of segment solutions with three to ten clusters was investigated. Stability analysis is necessary because cluster analysis is an exploratory method. This means that if only one computation is undertaken, the emerging solution could theoretically be a very unrepresentative random solution. To avoid this, a large number of computations is undertaken. Another issue in cluster analysis is how to determine which the optimal number of clusters (or segments, or student groups) is selected. Again, this question has to be determined by data structure analysis before the actual grouping task is undertaken (for a review of essential methodological considerations in the context of clustering data see Dolnicar (2002) and Dolnicar (2003)). Therefore, for each number of clusters within this range, 50 replications were computed and pair-wise student assignment matches were counted (This procedure of choosing the number of clusters most appropriate for the data set was suggested by Dolnicar, Grabler and Mazanec (2000)). The eight cluster solution emerged as most stable.

Students answered the motivation questions in a very simple way, only stating that each of the listed aspects is or is not a reason for them to attend lectures. This way of questioning led to a binary (only 0s and 1s contained) data block of the dimensions 12 (variables) \* 623 (students). A partitioning algorithm called Topology Representing Network (TRN, Martinetz and Schulten, 1994) was used to form the segments. The TRN randomly chooses representatives for each one of the segments. Then each of the respondents is compared to each of the representatives and assigned to the one with the most similar values. After the assignment to a group, the value of the representative is modified to capture the changes in the group caused by adding a new member. This process of assigning and adapting representatives is repeated for all respondents multiple

times, leading to a finer and finer grouping and ending when no significant changes in membership assignments occur anymore.

In order to interpret the resulting student segments, profiles are drawn that show their pattern of reasons to attend lectures. These profiles are given in Figure 1. This figure includes one chart per segment, where the columns represent the percentage of segment members who agree with every single lecture attendance motivation listed. The black horizontal line indicates the total students sample average (these values are therefore equal to the percentages in column 2 of Table 2). Segments are consequently characterised best by those motives for lecture attendance that deviate most from the total sample average as the sample average describes the mean values for all respondents, whereas the segment profiles depict the reasons to attend lectures specific to segments. Two of these segments are typical artifacts that emerge from partitioning procedures: one demonstrates extremely low agreement with each one of the motives, one a very high agreement. These two segments (segments number 1 and 2) are consequently not interpreted and have been omitted from Figure 1. The remaining student segments can be characterised as follows.

Segment 3 (7 percent of the sample) represents the students who are genuinely enthusiastic about attending lectures. In this study they are consequently labelled ‘idealists’. All of them state that they enjoy lectures; two thirds feel enthused by the lectures and about 80 percent report that the lectures make the knowledge meaningful. Segment 4 (17 percent) represents students who reported the opposite view. These students are referred to as ‘pragmatics’. They reported wanting to know what they need to learn; get information about assessment tasks; and make sure not to miss any relevant information. Students in segment 5 (11 percent) report similar motivations to the ‘pragmatics’. However they also report the feeling that attending lectures is easier than learning alone and that they make knowledge meaningful. This group thus differs from the pure pragmatic perspective in that content of the subject was important. This group is referred to as ‘averagely motivated students’ as they seem to be interested in formal information, but not very enthusiastic about attending lectures either. Segment 6, labelled the ‘fundamentals oriented students’ (15 percent) again report sharing the main pragmatic lecture attendance motives, but additionally report that lecture attendance assures learning the fundamentals of the subject. Segment 7 (14 percent) presents itself as the most minimalist among the pragmatic motivation groups and was labelled ‘minimalists’. Their only reported motivation to attend lectures was not to miss relevant information. Finally, Segment 8 (11 percent) reports that most of the listed reasons apply, except for enjoying lectures and feeling enthused by them. In this study this group is labelled the ‘everything but pleasure’ segment.

----- Figure 1 -----

A number of descriptive pieces of information can now be derived from these segments, which were constructed on the basis of general lecture attendance motives. These differences are summarised in Table 1, which includes the metric variables, and Table 2, which includes the categorical and ordinal variables. The cells with the strongest positive

deviations from the expected values based on the marginal are highlighted in bold, strong negative deviations are underlined. The two segments that seem to represent the most distant motivation patterns on the continuum of segments, can be further described as follows: the ‘idealists’ are older students, more than half of them work (and consequently they have the highest average work experience level in years) and they can mostly be found in Arts.

They rate the quality of the lecture higher than any other segment does. The ‘pragmatics’ are over-represented in the Commerce and Informatics Faculties, tend to be the youngest students on campus, are more often than expected of Australian origin and less frequently than expected Asian students (where ‘expected’ always refers to the expected number that should be occurring based on the representation of this subgroup in the sample). ‘Pragmatics’ give the lecture and the lecturers the worst marks of all segments, report the lowest lecture attendance rates and yet achieve the highest grade point averages.

----- Tables 3 and 4 -----

## **Conclusions and limitations**

The main reasons for students to attend lectures are to find out what they are supposed to learn, not to miss important information, and to find out about assessment tasks. This seems to reflect some of the more recent study results investigating lecture attendance (Browne and Race, 2002) while representing a dramatic motivational shift as opposed to the numerous studies that have been conducted into lecture attendance motivation in the 1970s (Bligh, 1972; Sheffield, 1974; Feldman, 1976) in which factors like stimulation of interest, gaining knowledge and enthusiasm dominated the student views. However, students are found to differ both with regard to their motivations as well as the level of lecture attendance.

A number of *a priori* reasons for differences in lecture attendance were investigated, based on the formulated research questions. It was found that lecture attendance varies across faculties (an association which has emerged in prior studies, see, for instance Brown and Atkins, 1988; Hunter and Tetley, 1999), that older students and student who work attend more lectures, and that good evaluations of lectures and lecturers are positively associated with attendance levels.

To investigate differences in student motivations, student responses were grouped into homogeneous segments based on their motivation patterns to attend lectures. At one extreme of the student motivation continuum ‘idealists’ could be identified who genuinely enjoy attending lectures and feel enthused by them. They can be characterised by being older and were more frequently encountered in Arts subjects. ‘Pragmatics’ are located at the other extreme. They mainly want to get the information they need to be successful in the subject. The latter are younger, more frequently found in Commerce, they express a low opinion of lecturers and lecture quality, and report the lowest attendance rates in the study.

While the main aim of this study was to gain insight into student's reasons to attend lectures in today's tertiary education environment in Australia, a number of educational consequences and thoughts emerge from these findings: Do lectures nowadays still fulfil their purpose or transferring knowledge or have they largely become pro-forma offers which are used by a minority of students? If 'pragmatics' (students who attend the fewest lectures) achieve the best results in their subjects, are we using bad assessment tasks to measure learning or are we indeed so bad lecturers that not listening to us improves student marks? Would it be better to try to aim at shifting attitude patterns back to where they were in the 1970s and motivate students to attend more lectures (in which case a detailed analysis of the 'idealist' and 'pragmatic' segments would be required to investigate ways of implementing such an attempt of shifting student motivations) or should we accept changing tertiary education realities and offer the information they seek online and stop offering lectures? If the most enthusiastic students are older and working, should lectures be always offered in the evenings, so the most motivated students can actually attend them?

The two major limitations of this study are the small sample sizes in certain faculties and the adopted convenience sampling procedure. Despite these problems, all results generate valuable insights, which can be used as empirical hypothesis for representative follow-up studies. Analyses based on the total sample (associations) are not crucially affected by the sampling problems, neither is the segmentation solution, as long as the proportions are not interpreted as valid for the entire student population. This means, that all findings about the existence and characteristics of those segments are valid, only the percentage representation in the total student population cannot be assured. The single most critical analysis is the investigation of differences across different faculties, as there were only very small sample sizes available from certain faculties. Those results should be taken as indicative only.

Other minor weaknesses of the study include the fact that lecture attendance was measured in a self-reported way. This clearly assumes honest answers to be given by the respondents. A better measure is unavailable due to the sizes of the lectures and consequently a lack of class roll information.

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## Tables

**Table 1: Student sample distribution across faculties**

|                              | <i>Frequency</i> | <i>Valid Percent</i> |
|------------------------------|------------------|----------------------|
| Arts                         | 156              | 25.5                 |
| Commerce                     | 294              | 48.0                 |
| Engineering                  | 33               | 5.4                  |
| Health & Behavioural Science | 53               | 8.7                  |
| Informatics                  | 71               | 11.6                 |
| Science                      | 5                | 0.8                  |
| Total                        | 612              | 100.0                |



**Table 2: Reasons to attend lectures**

|                                          | <i>Agreement for<br/>subject under<br/>study<br/>%</i> | <i>General<br/>agreement<br/>%</i> |
|------------------------------------------|--------------------------------------------------------|------------------------------------|
| Find out what I am supposed to learn     | 75                                                     | 78                                 |
| Don't want to miss important information | 68                                                     | 72                                 |
| Find out about assessment tasks          | 52                                                     | 59                                 |
| Make sure I learn fundamentals           | 38                                                     | 45                                 |
| Easier than learning it myself           | 37                                                     | 43                                 |
| Make knowledge meaningful                | 35                                                     | 39                                 |
| Expected to be there                     | 25                                                     | 30                                 |
| Enjoy them                               | 19                                                     | 21                                 |
| Find out 'real word' application         | 18                                                     | 21                                 |
| Work on problems                         | 15                                                     | 22                                 |
| Enthuses me                              | 13                                                     | 17                                 |
| Find out latest thinking                 | 13                                                     | 20                                 |

**Table 1: Metric segment descriptors (mean values)**

| <i>Segment</i>                     | <i>Quality of lecture</i> | <i>Quality of lecturer</i> | <i>How many lectures attended</i> | <i>Typical attendance rate</i> | <i>Years of work</i> | <i>Grade point average</i> |
|------------------------------------|---------------------------|----------------------------|-----------------------------------|--------------------------------|----------------------|----------------------------|
| 1                                  | 60                        | 64                         | 8.5                               | 11.2                           | 3.4                  | 70                         |
| 2                                  | 70                        | 73                         | 9.6                               | 14.2                           | 7.1                  | 70                         |
| 3 (Idealists)                      | <b>68</b>                 | 66                         | 9.5                               | 18.3                           | <b>7.1</b>           | 70                         |
| 4 (Pragmatics)                     | <u>55</u>                 | <u>59</u>                  | <u>7.6</u>                        | <u>10.8</u>                    | 4.7                  | <b>72</b>                  |
| 5 Averagely motivated students)    | 9.6                       | 12.0                       | 4.2                               | 70                             |                      |                            |
| 6 (Fundamentals oriented students) | 60                        | 65                         | 8.8                               | 13.1                           | <u>3.7</u>           | 66                         |
| 7 (Minimalists)                    | 62                        | 69                         | <b>10.2</b>                       | <b>15.1</b>                    | <u>3.3</u>           | 69                         |
| 8 (Everything but pleasure)        | <b>68</b>                 | <b>73</b>                  | 8.8                               | 11.0                           | 4.5                  | 64                         |
| <i>Total</i>                       | 62                        | 66                         | 8.93                              | 12.8                           | 4.8                  | 69                         |
| ANOVA                              |                           |                            |                                   |                                |                      |                            |
| p-value                            | < 0.01                    | <0.01                      | n.s.                              | <0.01                          | n.s.                 | <0.04                      |

**Table 2: Ordinal and categorical segment descriptors (percentage values)**

|               |                                 | 1  | 2  | 3         | 4         | 5         | 6         | 7         | 8         | Chi-square<br>p-value |
|---------------|---------------------------------|----|----|-----------|-----------|-----------|-----------|-----------|-----------|-----------------------|
| Faculty       | Arts                            | 18 | 40 | <b>57</b> | <u>16</u> | 25        | 23        | 32        | <u>14</u> | <0.001                |
|               | Commerce                        | 53 | 32 | <u>17</u> | <b>62</b> | 46        | 49        | 45        | 59        |                       |
|               | Engineering                     | 5  | 11 |           | 5         | 4         | <b>9</b>  | 4         | 5         |                       |
|               | Health & Behavioural Science    | 15 | 11 | 12        | <u>2</u>  | 9         | 7         | 8         | 10        |                       |
|               | Informatics                     | 10 | 7  | 14        | <b>14</b> | <b>16</b> | 12        | <u>7</u>  | 13        |                       |
|               | Science                         |    |    |           | 1         |           |           | <b>5</b>  |           |                       |
| Working       | No                              | 68 | 54 | <u>48</u> | 69        | <b>81</b> | <b>77</b> | 73        | 73        | <0.01                 |
|               | Yes                             | 32 | 46 | <b>52</b> | 31        | <u>19</u> | <u>23</u> | 27        | 27        |                       |
| Age           | 18-20                           | 33 | 47 | 38        | <b>52</b> | 46        | <b>53</b> | 40        | 35        | <0.001                |
|               | 21-23                           | 40 | 35 | <u>19</u> | 30        | 40        | 34        | 46        | 38        |                       |
|               | 24-26                           | 18 | 9  | 10        | 11        | 10        | <u>2</u>  | 8         | 21        |                       |
|               | 27-29                           | 6  | 2  | 7         | 1         | 1         | 3         | 2         |           |                       |
|               | 30 +                            | 3  | 7  | <b>26</b> | 7         | 3         | 8         | 4         | 6         |                       |
|               |                                 |    |    |           |           |           |           |           |           |                       |
| Family status | Single without children         | 74 | 72 | 69        | 81        | <b>93</b> | 85        | 81        | 78        | <0.01                 |
|               | Single with children            | 6  | 7  | 2         |           | 1         | 2         | 4         | 6         |                       |
|               | Partnered/married w/o children  | 7  | 7  | <b>7</b>  | 10        | 4         | 5         | <b>13</b> | 8         |                       |
|               | Partnered/married with children | 6  | 5  | 21        | 3         |           | 3         | 1         | 5         |                       |
|               | Other                           | 6  | 7  |           | 7         | 1         | 4         | 1         | 3         |                       |
|               |                                 |    |    |           |           |           |           |           |           |                       |
| Nationality   | Australia                       | 71 | 77 | 67        | <b>83</b> | 65        | <b>82</b> | <u>65</u> | 71        | <0.01                 |
|               | New Zealand                     |    |    |           | 2         |           |           |           |           |                       |
|               | USA                             | 2  | 7  | 7         | 1         | 6         | 1         | 4         | 5         |                       |
|               | Asia                            | 23 | 14 | 17        | <u>10</u> | 19        | <u>10</u> | <b>24</b> | 21        |                       |
|               | South or Latin America          |    | 2  |           | 2         |           |           | 1         | 2         |                       |
|               | Europe                          | 4  |    | 5         | 2         | <b>9</b>  | 5         | 4         | 2         |                       |
|               | Africa                          |    |    |           |           |           | 1         | 1         | 2         |                       |
|               |                                 |    |    |           |           |           |           |           |           |                       |

## Figures

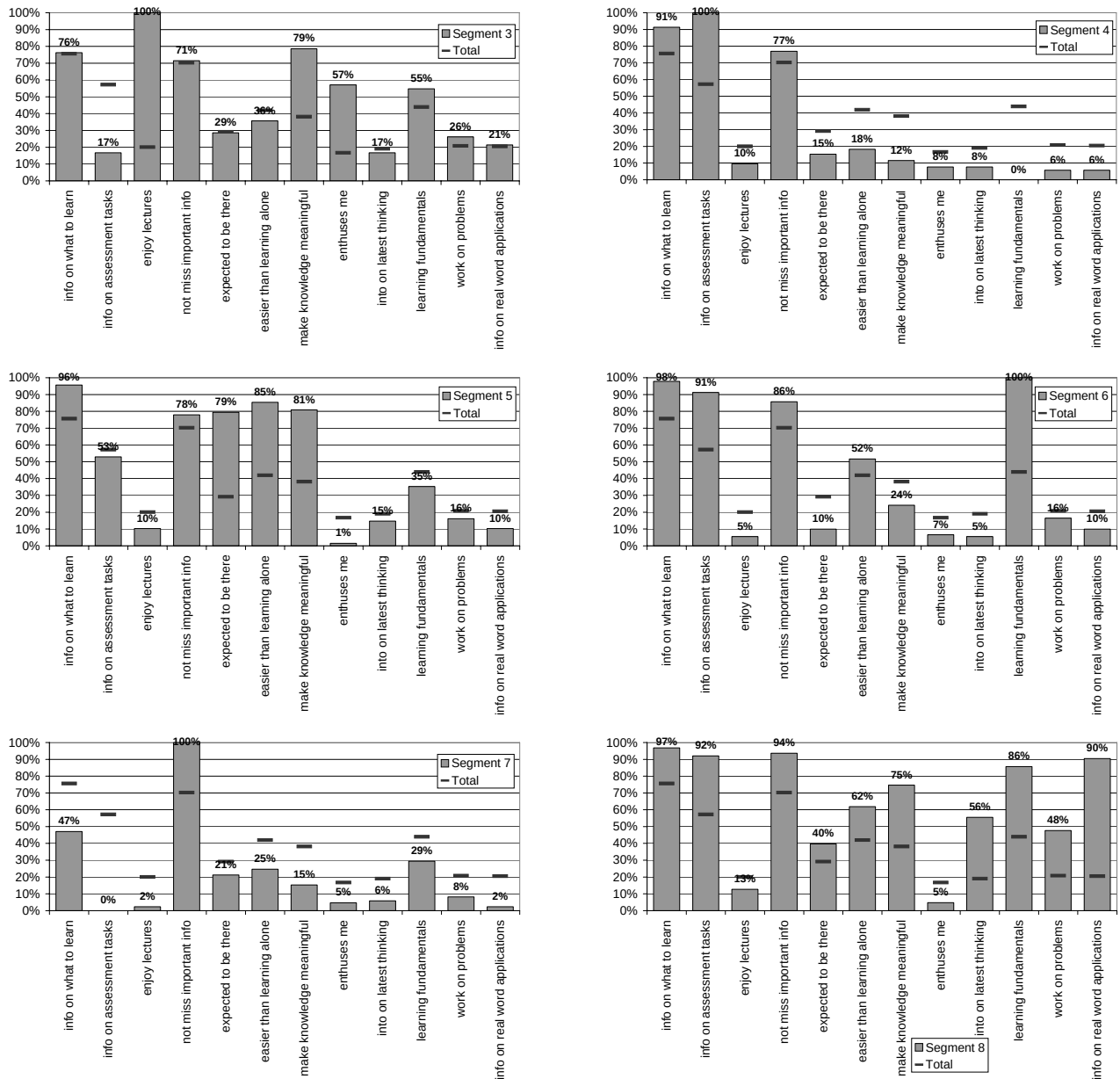


Figure 1: Psychographic student segments