The learning styles of first year distance education students

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Abstract

The purpose of this paper is to report on the results of research in progress on the learning styles of first year students studying with The Open Polytechnic of New Zealand. The paper reviews background literature on learning styles and distance education. It examines the learning styles profiles of the students and discusses the instructional design implications of those profiles.
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The Learning Styles of First Year Distance Education Students

Introduction

Within the field of distance education there is a lack of research in the area of individual differences such as learning styles, and a need for such research is acknowledged (Gibson, 1990, Riddle, 1992). Furthermore it has been suggested that matching learning styles with teaching methods developed to suit the style could increase both retention and achievement (Bajtelsmit, 1990). While distance education courses are known to have a higher rate of student dropout than full-time on campus courses and many reasons have been suggested for this, little attention has been given to a possible link between the learning styles of students learning by distance education and their retention and success in courses.

There are many factors influencing students studying by distance education, the complexity of these contributing to success and drop-out (Kember, 1990). Although there has been a great deal of research on drop out in distance education, there is a comparatively limited amount done specifically on students’ learning via distance education (Coggins, 1988). There is a resulting lack of knowledge as to how students learn in this environment, what their individual differences or learning styles preferences are, and what course design or support features may contribute to their success.

Reviewing the research in distance learning relating to learning styles, there are conflicting reports as to what the learning styles preferences of a distance education student are (Cookson, 1990). In a summary of the research on variables influencing learning performance Cookson comments that: “Learners whose cognitive personality style favours autonomy, flexibility and tolerance of ambiguity, and whose learning styles favour field-independence appear to prefer distance eduction over other forms of education, although not in all studies.” (p. 113). Eastmond (1992, p. 8) provides another viewpoint: “If I were to typify the learning style of the students who preferred distance education in any way, it would be their strong self-discipline and preference for structure. ... they wanted to be given concrete specifics about precisely what needed to be done, what the instructor expected, and when the assignments had to be completed.”
The learning styles’ literature, meanwhile, suggests that providing a learning environment matching the student’s style is more likely to encourage successful learning experiences (Dunn, 1990, Misko, 1994), making it a potentially useful area for research for those involved in distance education. Although teachers working in distance education may be unable to alter learning tasks and materials to suit the immediate needs and characteristics of individual learners (Cropley & Kahl, 1983), it is possible that some of these needs could be met by designing learning materials on the basis of student learning style preferences. There is some doubt expressed, however, as to whether distance education can cater for individuals’ abilities and style. For instance Holmberg (1986, p. 31) states that “To base the presentation of distance study courses of mass-communication character on the individual student’s cognitive structure is naturally an unattainable goal”. Given the widely accepted view that diversity is needed to accommodate individual variables such as learning style (Marland & Store, 1982), it is suggested that instructional design strategies could be incorporated into courses based on empirical evidence of what students’ learning styles are (Dekkers, Cuskelley, Kemp & Phillips 1993, Hutton, 1995b).
Learning Styles

Learning style has been defined as being “comprised of the conditions under which each person begins to concentrate on, absorb, process, and retain new or difficult information and skills” (Dunn, 1986, p. 3). This definition suggests that a person’s learning style could affect how they react to any learning situation, including learning by distance methods, therefore knowledge of learning style could help in the selection of appropriate instructional designs and teaching strategies for courses (Baker, Simon & Bazeli, 1986). Indeed De Bello states that ‘Knowledge of personality typology, temperament and learning style is vital in every aspect of education, from curricular design to pedagogy to teaching strategies’ (p. 429). Likewise Riddle (1992) emphasises the impact of learning styles on the teaching environment.

There are numerous other definitions of learning styles, most of which encompass essentially the same elements, but reflect the learning styles’ model developed or used by researchers and authors, or their interpretation of that model (Ferrel, 1983). For example Honey and Mumford (1992, p. 1) define the term learning styles “as a description of the attitudes and behaviours which determine an individuals’ preferred way of learning.” They have developed a model based on Kolb’s experiential learning cycle, the behavioural focus of their interpretation and use of the model being reflected in their definition. In comparison when reporting on a study using Kolb’s Learning Style Inventory, Baker et al. describe the concept as ‘A person’s learning style is part of that individual’s cognitive structure and refers to the characteristic style of acquiring and using information in learning and/or solving problems.’ (p. 2): a definition which has a more cognitive focus. Ferrel (1983), in her analysis of four learning-styles instruments, points out the difficulty of making comparisons between models when a single conception of learning styles has not been established. Although this study was undertaken 15 years ago when the concept of learning styles was comparatively new, there does not appear to have been any further consensus reached on a universal definition of the concept.

There is, however, general agreement that every person has a learning style and learning style strengths or preferences (Dunn, 1990). It is a term often found in educational literature and policy documents for example The New Zealand Curriculum Framework, (New Zealand Department of Education, 1993), although often not substantiated by any empirical research or attempts to define what exactly is being referred to. It is also acknowledged that people often lack awareness of what their learning styles preferences are (Honey & Mumford, 1992, Dunn & Deckinger, 1990).
Various proponents of learning styles have different opinions of the derivation or evolution of an individual’s learning style. Some claim that aspects of learning styles are genetic or biological, while others are developmental (Dunn, 1990). Research undertaken using the Dunn and Dunn model indicates that “...individual responses to sound, light, temperature, design, perception, intake, chronobiological highs and lows, mobility needs, and persistence appear to be biological in nature. In contrast, the sociological preferences, motivation, responsibility and need for structure are thought to be developmental” (Ingham, 1992, p. 39). Dunn (1986) states that style preferences change with maturation but that strong preferences can take years to change and such changes arise from personal motivation.

Others argue that learning styles develop solely in response to experience (Honey & Mumford, 1992). Honey & Mumford claim that preferences are “learned as people repeated strategies and tactics that were found to be successful and discontinued those that were not. In this way preferences for certain behaviour patterns develop and become habitual” (p. 5). They also argue that the choice of career can be a reflection of an individual’s learning style and can further influence the development of their learning style.

**The relevance of learning styles**

Educational researchers have developed theory acknowledging the importance of individuals’ attributes, including learning styles. References are made throughout instructional design literature to the need to accommodate variables in learner characteristics, for example Aronson & Briggs, 1983 and Kemp, 1985. Various suggestions have been put forward to cater for these variables. For instance Dekkers, Cuskelly, Kemp and Phillips (1993) drew on their study of students’ use of printed study materials to recommend incorporating a variety of design features in courses to accommodate a range of study techniques, and providing for individual assessment so that students can build on their own interests and experiences. The development of courses with flexible study paths providing options in routes (choices of units or topics and the order in which they are studied) and assessment is suggested by Kember (1990) as appropriate to meet the needs of individuals.
Garland’s study (1993) aimed to increase understanding of variables associated with persistence and withdrawal in distance education and included investigating students’ attitudes, confidence, learning styles and motivation. This study illustrated the diversity of individuals’ abilities and styles, but also highlighted the importance of epistemological variables which could impact on the individual. Misko also refers to the latter in a review of research on learning styles (1994, p. 40), pointing out that “Individual styles may differ according to subject areas, and styles may change as individuals become more competent, confident and mature with the content material of the subject or process they are working with.”

Research using the Dunn and Dunn Model has found that using a person’s perceptual strengths for taking in new information can make it easier for the individual to learn and remember (Dunn, 1988, 1990). While students can learn through more than one modality, complementing their strong learning styles preferences by matching instructional conditions or resources has been found to significantly increase assessment results (Dunn, 1988).
Distance education

Distance education is generally defined as study which is not under the continuous supervision of tutors who are physically present with their students: there is a physical distance between the student and the tutor (Holmberg, 1995, Naidu, 1994). Other definitions of distance education describe the communication process as being the characteristic distinguishing it from other traditional forms of education. For example Cropley & Kahl (1983, p. 28) describe it as ‘a kind of education based on communications procedures which permit the establishment of teaching/learning processes even where no face-to-face contact between teacher and learner exists.’

The terms distance education and open learning are frequently used interchangeably (Rowntree, 1992). The standard criteria for determining openness are the grounds of flexibility in regard to entry, time, place, and pace; criteria which can also be used in evaluating or discussing distance education. Some theorists go so far as to argue that distance education is a subset of open learning on the basis that open learning can take place in a lecture room or at a distance, whereas distance education must, by definition, be at a distance (Race, 1994). Given the context of the courses included in this research the term distance education will be used.

The practice of distance education tends to follow a standard pattern of students enrolling, being sent a package of mass-produced course materials which they work on independently, then sending in work for assessment by a teacher. The course materials are usually heavily reliant on the printed word, sometimes supplemented by audio and video tapes. Most communication between teacher and student is written and restricted to the assessment process, with some students making use of the telephone to contact their teachers. Many courses have compulsory start and finish dates. Some may include a block course at which students attend face to face sessions of a lecture or tutorial nature. Increasing technology options mean that some courses have other means of communication, such as audio and video conferencing. In addition the Internet is becoming more accepted and used as a means of course delivery.

With students having the choice of when and where to study, and at what pace they want to study (within the confines of their own personal circumstances as well as the deadlines set by the course), they have more freedom of choice than students studying in a face-to-face environment (Race, 1994). While in some respects this freedom is an advantage, it can create more problems than could be experienced by learners in a face-to-face environment. All learners potentially face problems of a similar nature, however distance may create additional problems for learners studying in that mode (Moore, 1989). For example the lack of immediate access to a tutor may create problems, or the only place available to study may not be suitable for the learner’s needs.
**Student characteristics**

Within any learning environment the presence or absence of certain learner characteristics may serve to aid the learner, or be a barrier to their learning. Given the differences between learning by distance and in a face-to-face mode, it is conceivable that the method of delivery may advantage or disadvantage students depending on their characteristics. Cropley and Kahl (1983, p.28) refer to distance education and face-to-face education “not as encompassing particular sets of organisational provisions aimed at promoting learning, but as involving particular kinds of learning processes which are facilitated by the presence in learners of certain psychological characteristics and which at the same time promote the growth of such characteristics”.

Kasworm and Yao point out that “each learner brings to the learning experience varied psychological and cultural factors, such as individual learning styles, the goals for involvement in learning, expectations and motivations, educational history and beliefs of learning, and maturity” (1992, p. 78). Furthermore they argue that certain characteristics are necessary in distance education, such as internal motivation. As students do not have a class timetable or teacher to structure their learning times, they must be motivated to do it themselves. However the separation of the teacher and the learner can create a barrier to learning for some which is demotivating (Myer, Fletcher, & Gill, 1992), nor do distance learners usually have access to fellow students who can aid motivation by giving support and encouragement.

A characteristic often referred to as a requirement for distance education students is that of being ‘self-directed’, or of being ‘independent’, terms which are at times used interchangeably. Such is the importance of this characteristic that some institutions such as The Open Polytechnic of New Zealand (1994) specifically aim to create independent learners. Paul (1990, p. 83) describes the concept of an independent learner as

“not an absolute one, but a notion that graduates should be more ‘self-sufficient’ learners than they were at the point of entry. It involves changes in personal values (openness to new ideas and to rethinking current beliefs) and attitudes (self-motivation), as well as the development of new skills (time management, study skills, problem conceptualisation, critical and lateral thinking, and research and library skills). A quest never completely fulfilled, it is a process central to the concepts of open learning and lifelong education.”

Candy (1991) makes links between independent learning and self-directed learning, claiming that they are both catchall phrases for “educational practices having some bearing on the notion of learner-control” (p. 11). When learners are in “new, unfamiliar situations where they have no experience with the subject area’ or where ‘they have low self-esteem, related to their personal lives or to
the instructional situations or they have never experienced self-directed learning”, adult learners will be dependent according to Cranton (1989, p. 202). Discussing the issues surrounding dependency Cranton refers to instructional design based on the characteristics of the learner as a solution, with particular reference to addressing learning styles.

**Instructional design**

A common feature of distance education course development is the use of a formal system of instructional design. Rogoff (1987) describes instructional design as “the systematic process of designing an instructional solution to an educational or training problem.” (p. 146). She outlines a model of instructional design, stipulating that instructional design “requires identifying causes of the problem, determining instructional objectives, and recommending or outlining instructional methods and materials.”

In the distance education setting courses are usually developed with the assistance of an instructional designer acting as an adviser to a writer, or with a course design team including a designer, writer, project leader, and publishing experts. Such a process is thought to improve the quality of the courses produced (Kelly, 1987) and is guided by educational theories and principles.

Various theorists have suggested principles to guide the instructional design process. Naidu argues that “teaching learners how to learn and to retrieve what has been learned ought to be the primary concern of instructional systems and instructional designers” (1994, p. 27). Kasworm and Yao (1992) place emphasis on structuring design to encourage active learning, in particular to develop autonomous and self-directed learning strategies, while also recognising the individual experiences and variables, such as learning styles, which a learner brings to a learning situation. Holmberg (1986) takes a similar stance, proposing that there should be a cognitive orientation and strategies developed which enhance deeper-level processing of content. He also suggests that the individuals’ learning styles need to be accommodated.

Unfortunately there is little knowledge available about the learning styles of distance education students or how they use their learning materials (Dekkers, Cuskley, Kemp & Phillips, 1993). Kember attests to this stating that “There is currently very little in the way of empirically based work to help choose between the wide variety of formats that can be, and are used for open learning” (1995, p. 21).
Drop out in distance education

A phenomenon of distance education is its high drop-out rate in comparison to full-time courses presented in a face to face mode (Kember, 1995). Peters (1992) defines drop-out in terms of “a student who ends studies prematurely and thus does not sit examinations” (p. 235). Such has been the concern about drop-out that it is cited as being the most frequently researched topic in distance education (Cookson, 1990, Garrison, 1987) with studies falling into various categories classified by Cookson: studies of learners’ reasons for withdrawal, student profile studies and studies of institutional factors (p. 202). There are known to be many causes of drop-out in distance education, and many explanations as to why. Taking into account all the various reasons it is doubtful whether one single cause could be isolated as an explanation, nor could there be one single simple solution to reduce or eliminate drop-out (Kember, 1990, 1995).

Although many reasons have been suggested for the higher rate of student drop-out in distance education courses (Kember, 1995) little attention has been given to a possible link between the learning styles of students learning by distance education, and their retention and success in courses. Many distance education courses are still paper based, with only a limited use of alternative media. This may limit the teaching style of courses, which can vary according to a number of factors, for example the learning style of the writer of the course, the instructional designer, the subject matter, and the constraints of the institution. The resulting teaching style of courses may not match the learning style of some students, and could therefore contribute to the high rate of drop-out.

Moore (1989) notes that traditional forms of education and distance education often attract learners from divergent populations, with the possibility that a larger proportion of distance learners may be affected by learner problems. Moore also claims that “a great deal is known about the problems and needs of adult learners in distance education” (p. 97). The high drop-out rates experienced in distance education could be interpreted as a reflection of the end result of these learner problems. While this may be true to an extent, it is also conceivable that it is a reflection of distance education’s inability to date to cater for differences in individuals’ abilities and styles by providing courses with teaching styles that match or meet the needs of all students.
Distance education in the future

With the changing nature of education, particularly due to technology developments, distance education is likely to become more integrated with traditional education in the future (Garrison, 1989). Instead of being a second choice, often used when the time, availability or location of courses prohibits students from enrolling in face-to-face courses, distance education will be acceptable as an alternative of equal standing. As more courses are offered via the Internet, ostensibly being distance education courses, these may be adopted as teaching resources within standard classrooms with minimal teaching support offered by the teacher who is physically present.

The future learning environment must place an even greater emphasis on supporting the learning needs of students in order to make effective use of the resources available. The instructional design of courses based on research into the characteristics and needs of students, including their learning styles, may help prevent the high rates of drop out which are currently a feature of distance education. The study discussed in this paper aims to contribute to the knowledge base available in this area.
The research

This study investigates the relationship between the learning styles of first-time, first year students studying by distance education with the Open Polytechnic of New Zealand, and the success and retention of these students in various first year courses. Five courses from different programmes and disciplines were selected for inclusion in the study and analysed to determine various aspects of their teaching styles. Students enrolled in these courses were surveyed to ascertain their learning styles. The learning styles profiles of the students are being compared to the course teaching style to find out if there is a match or mismatch and the possible relationship to success and retention.

The main aim of the research is to discover if there is a relationship between the learning styles of first year students at The Open Polytechnic of New Zealand, and their success and retention in distance education courses. Other aims of the research included establishing learning styles profiles of groups of students, and comparing these with the teaching style of the courses they were enrolled in. This paper examines the learning styles profiles of the groups of students.

Methodology

In order to ascertain the learning styles profiles of students a variety of learning styles models and instruments were reviewed to determine an appropriate instrument for the study. An established and well researched instrument with known validity was thought to be of greater use than creating a new instrument which would need to be proved valid for the results to be credible.

Comparing the individual learning styles profiles with the results achieved by students in the course in terms of success, failure or drop out was planned with the aim of highlighting any particular learning styles preferences which could be linked with course results. Further analysis of the profiles on the basis of other personal factors, including age, education, gender, and ethnic background was planned to determine if there were particular learning styles preferences which could be linked with those factors, or whether the factors themselves could be linked with course results. Evaluating the course to determine their teaching styles was planned so that instructional strategies and methods of delivery could be determined which might match with the learning styles preferences of students.

A pilot study was run in 1994 to test the proposed methodology and evaluate the merits of such a study (Hutton, 1995). The pilot study provided results which indicated the value of a further study incorporating different courses so that comparisons could be made of student groups drawn from various sources,
on the basis that a possible explanation for differences could be because of the varying backgrounds and aims of the students. By including a variety of courses it was hoped that the impact of using different media and design strategies would be apparent which may have further supported students with particular learning styles preferences. One change was made to the methodology as a result of the pilot study, being a modification of the method of evaluating the courses.

Five courses were selected from which to choose the samples of students on the basis of the numbers enrolled at the close of enrolments at the beginning of the academic year. They needed to be first year courses which were part of an ongoing programme. While various courses had significant numbers of students enrolled, the selection was narrowed to those with significant numbers of first-time students new to study with The Open Polytechnic of New Zealand.

Once the courses were selected, all first time students within those courses were sent a Productivity Environmental Preference Survey (Dunn, Dunn, & Price, 1979, 1982, 1986), with a covering letter, information sheet and consent form. These were sent in March, 1997, followed by a reminder letter in April. Code numbers were allocated to each student to ensure confidentiality.

When the surveys were returned, they were processed and the learning styles profiles produced. The student enrolment data base was accessed and relevant data recorded in another data base to amalgamate that data with the learning styles profiles.

The research instrument: The research instrument used to assess the learning styles of students was the Productivity Environment Preference Survey by Dunn, Dunn and Price (1979, 1982, 1986), which includes 100 questions using a Likert scale for responses. This aims to identify adults preferences for learning, functioning, and performing in their work or study activities (Blakemore, McCray & Coker, 1984).

The Dunn and Dunn Learning Styles model was developed after 11 years of research (Dunn, 1986). Since 1978 it has been used in research studies at more than 70 universities (Dunn, 1993). It is claimed that it is the most widely documented assessment instrument due to the extensive amount of research undertaken using it and is reputed to have one of the highest reliability and validity of learning styles instruments (Dunn, 1990, De Bello, 1990).

From the survey instrument a profile is generated giving 22 preferences which fall into five categories of environmental factors, emotional factors, sociological factors, physiological factors and psychological factors. Students’ preferences can either be in the neutral range and have little, if any, impact on how they
learn; alternatively they can have a high or low preference which can have a considerable influence on how they learn.

Thirteen preferences were selected as relevant for the purposes of the study, chosen on the basis of their possible impact on students studying at a distance, these being preferences which could be affected by the course being studied, the student support offered, or psychological aspects which could influence their studies. The preferences were:

- Motivation for academic learning
- Persistence while learning
- Responsibility for academic learning
- Structure versus options while learning
- Learning alone or with peers
- Learning with an authority figure
- Needing variety
- Learning by listening
- Learning by reading or viewing (visual)
- Learning by touching (tactile)
- Learning by doing (kinesthetic)
- Global
- Analytic

**Basis of course selection:** Courses were selected on the basis of their level within an on-going programme and the number of first year, first-time students enrolled in the course. The reason for selecting courses in ongoing programmes was that students would be likely to enrol with a view to continuing their studies with The Open Polytechnic, and would therefore have different characteristics and motivations than if they were doing a stand-alone course. The courses included:

- Business Communication - a compulsory course which is part of the New Zealand diploma in Business Studies,
- Counselling Theory - an elective course, in the Bachelor of Applied Science,
• Introduction to Information Systems and Technology - a compulsory course in the Bachelor of Business and Bachelor of Applied Science,

• Introduction to Law - a compulsory course which is part of the Business Studies degree,

• Introduction to Landscaping - a core course for the National Certificate in Horticulture.

By choosing a diverse range of courses it was hoped that a variety of strategies and styles of instruction would be found in the courses, and that the students could possibly present different profiles between courses.

**Basis of student selection:** Students were selected on the basis of being first year, first time students with the Open Polytechnic. The rationale behind this was that for most of these students studying by distance methods would be a new experience, which might or might not suit their particular needs and learning styles. If it didn’t suit them they would be more likely to drop-out or not enrol in any further courses. Students who were re-enrolling had already shown a preference for this method of learning so would be more likely to stay in a course and be successful. Data gathered in the pilot study confirmed this assumption.

**Other sources of student data:** When students enrol details of their background are entered into a computerised student data base. These records were accessed to ascertain data thought to be of value to the research. This data included age, gender, employment, highest educational qualification, and ethnic background. In addition students were asked to verify whether they had ever studied by distance before. The rationale behind the request for the latter information was that if they had chosen to study by distance before, they would be aware of the challenges of learning in the environment. The students may have developed or already had strategies for studying this way, and would demonstrating a preference for it which other first year students might not do if they had previous experience with another distance learning institute.
Results and discussion

Response

From the initial enrolments of 1008 students in the 5 courses, 364 were identified as first-time students. The survey instrument and information were posted to all 364 students: 144 responded, which equates to a response rate of 40%. In the pilot study it was found that non-respondents had a higher dropout rate than respondents, possibly reflecting that they had already made the decision not to continue with their studies and therefore did not return the survey instrument. Initial analysis of data from course completions indicates that a similar pattern has occurred, with fewer non-respondents completing the courses.

Table 1 Population and sample: survey response rate

<table>
<thead>
<tr>
<th>Courses</th>
<th>Total enrolled</th>
<th>1997 Students</th>
<th>No. of respondents</th>
<th>Return %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Communication</td>
<td>397</td>
<td>187</td>
<td>72</td>
<td>39%</td>
</tr>
<tr>
<td>Counselling Theory</td>
<td>238</td>
<td>48</td>
<td>22</td>
<td>46%</td>
</tr>
<tr>
<td>Introduction to Information Systems and Technology</td>
<td>36</td>
<td>56</td>
<td>22</td>
<td>40%</td>
</tr>
<tr>
<td>Introduction to Law</td>
<td>127</td>
<td>52</td>
<td>17</td>
<td>33%</td>
</tr>
<tr>
<td>Introduction to Landscaping</td>
<td>110</td>
<td>21</td>
<td>11</td>
<td>52%</td>
</tr>
<tr>
<td></td>
<td>1008</td>
<td>364</td>
<td>144</td>
<td>40%</td>
</tr>
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Student profiles

Group profiles are being generated on the basis of the courses students were enrolled in, gender, age, educational background, and ethnic background, specifically Maori students. For the purposes of this paper the group course profiles are examined and discussed. To enable easy comparison separate graphs including each of the five courses are used for the four relevant categories of the Dunn and Dunn Learning Styles Model (physiological factors, emotional factors, sociological factors, and psychological factors). Graphs for each category show the percentage of students with high preferences and low preferences.
Physiological factors

Only preferences relating to perceptual aspects of learning styles were included in this study. These are the sensory modalities people use to take in information, and include visual, auditory, tactile, and kinesthetic. Most people have a single perceptual strength, however some like to learn in a variety of different ways.

Graph 1: High physiological factors - sensory modalities
Of the 144 respondents, only four (3%) had a high preference for visual learning. There were twice as many tactile learners as visual learners - 8 (6%), while only 3 (2%) were kinesthetic. An interesting result, which replicates the results of the pilot study, was the high preference for auditory learning with 42 students (30%) having this preference. While the pilot study results did not indicate any link between success and retention, research has shown that students learn more easily and remember more when the method of presentation matches their perceptual strength (Dunn, 1988). Although some of the courses did include audio and video tapes for assessment purposes or to provide examples of the content being studied, the main media for presenting the courses was printed materials.

**Emotional factors**

Included here are motivation, persistence during learning, responsibility, or non-conforming versus conforming, and structure versus options while learning.
Graph 3: High emotional preferences
Few students had a high preference for motivation, persistence, or responsibility: characteristics which would be useful in a learning environment where students have to be more self-motivated, persistent and responsible as they don’t have the immediate support of a teacher or fellow students. Seven (5%) students had a high preference for motivation, which means they viewed themselves as being highly motivated. 9 (6%) students had a low preference for motivation. Only 10 (7%) students had a high persistence score while 12 (8%) rated themselves low in this area. People with a low preference for persistence often start many things which they don’t finish, as compared to those with a high preference who usually complete the things they start. Four (3%) students had a high responsibility preference, while 22 (16%) were low in this area. The latter preference is associated with being easily diverted from learning tasks, while a high preference is associated with being able to complete tasks with minimal supervision.

Once again the study confirmed the pilot study with a large number of students - 52 (37%) having a high preference for structure. A low preference for structure relates to people being more self-directed and able to work on their own without being told what to do. In comparison those with a high need for
structure often need to be told exactly what to do with very explicit directions. In the pilot study this result was linked to a noticeably higher dropout or failure rate, especially if combined with a need for an authority person.

**Sociological factors**

This includes two preferences: a need to study alone, or with peers; and the need for an authority figure present. Students with a high need for working with peers will show as having a high preference, while those who prefer to study alone will show a low preference.

**Graph 5: High sociological preferences**
Graph 6: Low sociological preferences

There was a noticeable variation between courses in terms of the need for an authority figure present, varying from 5% to 23%, with an average total of 8% of all respondents (11 students out of 144), indicating that some of these adult students would still prefer to have a teacher present. Although only 11 students overall preferred to work with their peers, a proportionally larger number (5) of these were in the Counselling Theory course which is perhaps indicative of the nature of the course and the students it would attract who would be expected to be more people oriented. In comparison, of the 19 (13%) of students who preferred to work on their own, 5 of these were in the Introduction to Law course.

**Psychological factors**

This looks at the hemispheric, or brain processing aspect of learning styles. The terms describing this in the literature are used interchangeably and are often referred to as left or right brain, inductive or deductive, sequential or simultaneous, or analytic and global as the Dunn and Dunn Model refers to them (1989).
Few students had strong preferences in these areas, only 2 (1%) being strongly
global thinkers, and 9 (6%) being strongly analytical. As these preferences can
change over time, students could therefore develop stronger preferences in
these areas as they develop in response to an academic environment.

On the basis of these results a number of instructional design considerations are
indicated:

- A greater variety of methods of presentation are needed to match the
  sensory modalities of students, with a greater emphasis on auditory
  instructional delivery media. The courses in the study relied largely on
  printed materials to present content, however more audio tapes or video
tapes could be developed, or a greater use made of audio-conferencing and
  student study groups or tutorials. Computer packages with an auditory
  component may also help. Alternatively, or in addition, a method of
  identifying students’ perceptual strengths could be incorporated into the
courses or a study skills package which could help students determine their
  own strengths and enable them to use strategies making it easier for them to
  adapt to various instructional environments.
• Recognising that few students had preferences relating to high motivation or persistence, strategies could be incorporated into courses to develop these areas, such as exercises in goal setting which were supported by tutorial staff. This could be repetitive if included in every first year course, so an alternative would be to develop a study skills package which worked directly on helping students acquire the related strategies.

• Students could be actively encouraged and supported in forming study groups or working with study buddies which may assist with meeting the needs of those having a high preference for working with peers.

• Students are often reluctant to make the first contact with their tutors or lecturers. If academic staff were able to be proactive in making personal contact with students, such as an initial personal telephone call, the barriers for making this contact might be removed. This could be particularly encouraging for those with a high need for an authority person present who may feel more able to initiate contact.

• Some design strategies that meet a need for structure are easily incorporated into courses, for example providing study timetables, explicit instructions regarding learning and assessment, overviews and summaries, and meaningful course maps showing the linkages between components of the course. Again, these strategies could be addressed in a study skills package.
Conclusion

There were a variety of learning needs evident from the learning styles profiles of the students involved in this study, which may or may not have been met by the courses they were enrolled in. The difficulties experienced by students engaged in study by distance education in the past may have been as a result of mass produced courses (Peters, 1992) which by their nature, could only accommodate certain needs especially when they were not designed on the basis of empirical evidence of what students needs were.

Rowntree (1985) warns against assuming that students possess learning styles that are inherent, unalterable, and inflexible. This view supports the explicit inclusion of strategies which develop the ability of students to learn flexibly, based on how they learn initially, providing “learning to learn” skills which encourage development of other skills, thereby reducing the impact of individual differences (Gropper, 1983).

The most significant result of this study, as in the pilot study, was the high need for structure which is the opposite of being self-directed. An expectation of distance learners is that they be independent and self directed, yet these results indicate that a significant number of students are not. Candy (1991) points out that educators are obliged to not only recognise individuals’ learning styles and needs, but to help students develop strategies enabling them to cope with learning situations in which they feel less confident.

There are many strategies which can be incorporated into courses to help meet students learning needs. The improvements to the quality of courses from the increasing recognition of instructional design principles and use of instructional designers when developing courses is one way of addressing these needs. Rapid developments in the availability and use of technology such as the Internet, or Web, can also help meet these needs. As Montgomery (1995) points out “Multimedia and computer software in general can go a long way to filling in the gaps caused by a dichotomy of learning and teaching styles. In addition, an awareness of the pedagogical needs of various learning styles can result in more effective multimedia software” (p. 10). While there is no substantive empirical research available as yet to verify the benefits of use of such technology to meet the learning styles needs of students, the indications are that it may do so.
References


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