The influence of learning styles preference of undergraduate nursing students on educational outcomes in substance use education

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Summary  This paper reports a study identifying the learning styles preference of undergraduate nursing students and examining its influence on educational outcomes. There are limited recent studies in the UK on the learning styles preference of undergraduate and its influence on educational outcomes. A purposive sample of 110 undergraduate nursing students completed a demographic questionnaire and the Honey and Mumford’s learning styles inventory. A pre-post-test design was used to evaluate the educational outcomes. Reflector learning styles preference was the dominant learning styles among the majority of undergraduate nursing students. An interesting phenomenon about the distribution of the learning styles preference is the additional “dual” learning style category. The hypothesis that learning styles preference will determine knowledge acquisition, changes in attitude and intervention confidence skills was rejected. However, as this is a multi-layered hypothesis the findings showed that only the dual learning styles preference group was found to have a significant influence in intervention confidence skills. Further research is warranted to replicate this study using the same methodology but with several different population samples specialising in different branch of nursing. As there are limited literature on the dual learning styles preferences, this dual preference phenomenon needs further investigation to establish its acceptability in nursing education.

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1 Independent Educational Consultation in Addiction.
Introduction

During the last decade, there have been enormous advances in nurse education to ensure that skills and competency are given equal value to theoretical teaching and initiatives undertaken by some higher educational institutions in the introduction of developments skills laboratories. Much of this educational drive has been prompted by the publication of 'Making a Difference' (Department of Health, 1999, 2000) which refocused attention upon the interface between theory and practice with more practice-oriented based teaching and 'Fitness for Practice' (UKCC, 1999) which set out a major restructuring of pre-registration training. The shift of the education paradigm from teaching to learning activities and a range of approaches have been advocated to optimise learning and meeting the learning needs of the diverse students’ population.

The requirements to provide a range of teaching approaches had been highlighted in response to UK Government reports on the impact of technology on teaching and learning (Dearing Report, 1997). The Dearing Report (1997) Higher Education in the Learning Society has endorsed learner-centred approaches and emphasises that learners should come to know their own learning styles. For learning tasks, they stated that ‘an effective strategy is to guide and enable learners to be effective learners to understand their own learning styles and to manage their own learning’ (Dearing Report, 1997, p. 24). Researchers support a classroom environment that accommodates the learning styles preference of students (Dunn et al., 1989). In fact, educators have known for years that learning styles affect the way students learn and significant relationships have been identified among learning styles preference, including gender, personality, student retention, clinical education and academic achievement (Vittoe and Hooker, 1983; Carroll, 1992; O’Brien and Wilkinson, 1992; Nelson et al., 1993; O’Brien, 1994). According to Honey and Mumford (1992); there are four learning styles preference: reflector, activist, pragmatist and theorist. Reflector student is thoughtful before acting, good listeners, like to research and evaluate and make decisions in their own time. The activist student likes to take direct action, welcomes new challenges and experiences and is primarily interested in the here and now. The theorist student is logical and objective pays great attention to detail, likes to see the overall picture and to have structure and clear objectives. The pragmatist student likes to see how things work in practice, enjoys experimenting with new ideas and likes to solve problems and is practical (Honey and Mumford, 1992).

A fourth learning styles, mainly the ‘reflector—theorist’ preferred style, has also been documented in studies with nurses (O’Brien and Wilkinson, 1992, physical therapy students (Olson, 2000) and with general practitioners (Lesmes-Anel et al., 2001; McCall et al., 2005).

The aims of the study were to identify the learning styles preference of undergraduate nursing students and to examine its influence on knowledge acquisition, attitude and intervention confidence skills in alcohol and drug education.

Background

Research in educational settings indicates that learning style is a valid psychological construct (Smith et al., 1989) and an important determinant of educational attainment (Dunn and Dunn, 1993). It differs from ability or intelligence in that one learning style is not presumed to be better than another, that is, it is not value-directional (Messick, 1994). In the context of the study, a learning style is described as being: ‘... a description of the attitudes and behaviour which determine an individual’s preferred way of learning’ (Honey and Mumford, 1992, p. 1). The potential educational importance of information about students’ learning styles, in higher education has been highlighted by Marton (1986) from the results of several research studies. The conclusions reached are that ‘there are definite relationships between the ways in which an individual conceptualises learning, the processes by which the individual attempts to learn, and the outcomes of the individual’s attempts to learn’ (p. 37). Thus, learning styles preference influences the way in which students respond to an educational programme or curriculum in relation to mastering its goals and objectives.

Learning styles have been extensively investigated in nursing and nursing education using mainly Kolb’s learning styles inventory (Kolb, 1984). However, there is limited recent studies in the UK on the learning styles preference of undergraduate and its relationship with demographic variables and educational outcomes. The literature is based on nursing and non-nursing sources. Wilkerson (1986), using Kolb LSI, examined the relationship between learning styles preference, knowledge, analysis of clinical situations and application of the nursing process with a sample of nursing students (n = 133). The findings showed that there was a negative correlation on all outcome measures for the reflective observation (RO) and a positive correlation of all outcome measures for the abstract conceptualization subscale. This suggests...
that those students who were cognitive oriented perform better on the different measures compared to those with concrete experiences. Zemaitis (1987), using Kolb LSI, investigated the relationship between learning style, years of experience in clinical speciality and grade point average with nurses (n = 121). No significant relationship was found among the variables. The dominant learning style preference found was accommodators. In a study of 113 undergraduate nursing students, DeCoux (1990) also found no significant relationship between academic achievement, learning style, stage of intellectual development and age.

A study of undergraduate medical students by McManus and Richards (1998) examined performance, clinical experience and learning styles preference to assess whether clinical experience had an effect on their final examinations. No significant relationship was found between overall performance in the final examinations and clinical experience. The only predictor of overall performance was related to study skills. Wang et al. (2001), using the Kolb LSI, examined the relationship between learning styles preference, academic performance and satisfaction with students using computer supported collaborative learning. The authors found that learning styles preference had no influence on neither academic performance outcomes nor upon student satisfaction. In addition, changes on learning styles preference were reported but this had no influence on satisfaction or performance.

A number of studies have examined the relationship between learning style, assessment method and academic performance. This highlights the importance of understanding learning styles preference to effectively evaluate the level and quality of student acquisition of knowledge and various skills. While some studies show relationships between grades and the converging learning style (Boyatzis and Mainemelis, 2000; Rutz, 2003), other studies indicate that these learning style differences in student performance may be a function of the assessment technique used. Holley and Jenkins (1993), using Kolb LSI, studied the relationship between learning styles and three examinations containing a variety of multiple-choice (theory and quantitative) and open-ended questions (theory and quantitative) among accountancy students (n = 49). They reported a correlation between grade point average and performance. The multiple-choice quantitative format was the only measure not correlated with the various learning styles preference.

Lynch et al. (1998) examined the relationship between learning style and three different academic performance measures in a third year medical students (n = 227). The examinations rely on a multiple-choice question format to assess performance and complex computer simulation (CBX) to measure clinical management skills. The result indicated that convergers (pragmatist) and assimilators (theorist) learners scored significantly higher on the two multiple-choice performance measures. The authors concluded that the results are congruent with Kolb (1984) and Newland and Newland (1992) assertion that convergers and assimilators learners may have a performance advantage on objective multiple-choice examination. They also concluded that the absence of relationship between learning style and the CBX simulation suggests that multiple-choice examination and clinical case simulations measure different capabilities and achievements. The findings showed that multiple-choice examinations favour abstract learners whereas clinical performance requires additional cognitive skills and behaviours that are not adequately reflected in objective measures of performance. The data demonstrate the importance of applying more than one type of examination format in order to evaluate educational outcomes. Oughton and Reed (2000) measured the relationship between graduate students’ learning styles and performance outcome in a hypermedia environment. The results showed that assimilators and divergers were the most productive on their concept maps. The authors concluded that the results could be attributed to the common traits shared by the two learning styles: the ability to see many perspectives and the ability to generate many ideas.

Overall, the studies suggest that the relationship of learning style with academic performance appears to be determined by the way learning is assessed. The implications of this finding are particularly significant in the experiential method of teaching where several learning strategies are used to target acquisition of skills associated with the learning styles preference. In addition, the measurements of educational outcomes in relation to knowledge, skills and attitudes need to accommodate the different learning styles. A multidimensional assessment is necessary to adequately and fairly evaluate the educational outcomes of students.

**Methods**

**Aims**

The aims of this exploratory study were to identify the learning styles preference of undergraduate
nursing students and to examine its influence on knowledge acquisition, attitude and intervention confidence skills in alcohol and drug education. The following hypothesis was tested: students grouped by their dominant learning styles preference will determine their knowledge acquisition, changes in attitude and intervention confidence skills.

Sample

The participants were recruited from undergraduate nursing students who were in their second year of their educational programme and following the mental health branch. Four cohorts cohort of undergraduate nursing students undertaking an educational programme on alcohol and drug education were identified to take part in the study. Two educational institutions were based in an urban area and one based in a rural area.

Educational intervention

An educational programme was developed based on the curriculum guidelines for substance misuse education in undergraduate nursing education programmes (ENB, 1996). The educational interventions were presented by different facilitators who were familiar with the educational programme. The education module was presented in eight sessions (10 h). All four cohorts received a study guide prior to course initiation which included: indicative content, aims, learning outcomes, references and further reading. The objectives of the educational interventions were to: recognise own attitudes towards substance misuse; drug use and the stereotypes that are applied; describe briefly the method of use and the effects of commonly misuse psychoactive substances; identify 3 screening methods for use in alcohol and drug; carry out a basic drug and alcohol assessment, outline the prevention strategies and treatment options available for substance misusers; and discuss the role of the nurse in the assessment and treatment of substance misuse. The structure, content and methods of teaching and learning of the education module were:

Instruments

Self-reported instruments including the demographic profile questionnaire (DPQ) and the learning style questionnaire (LSQ) (Honey and Mumford, 2000) were used at baseline. For the measurement of educational intervention, the pre- and post-test instruments included: knowledge questionnaire, attitude questionnaire and intervention confidence skills scale. The addiction knowledge questionnaire has a multiple-choice format with 21 items (Cronbach’s Alpha 0.80). The attitude towards substance misusers questionnaire has 10 items based on the Likert’s scale (Cronbach’s Alpha 0.80). The addiction intervention confidence scale has 16 items based on the visual; analogue scale (Cronbach’s Alpha 0.94). All instruments were considered to have face validity.

Procedure

There were two measurements points for the cohorts: a baseline (pre-test) before the implementation of the educational programme and 8–10 weeks post-educational programme. In order to achieve a maximum response, and to answer questions students may have had during the completion of the questionnaires, the questionnaires were administered in the controlled environment of formal class time. The students from each cohort who consented to take part in the study were asked to complete the consent form and provided an information sheet about the study. Immediately following this procedure, the following pre-test questionnaires were administered — demographic profile, learning styles, addiction knowledge, attitude and addiction intervention confidence skills. Further arrangements were made for the students to undertake the post-test which included the knowledge and attitude questionnaires and the intervention confidence skills scale by group administration. This time-frame to administer the post-test was chosen to avoid test/retest effect and to test long-term influences of educational outcomes.

Ethical approval

Ethical approval for this study was sought and granted by the institutions’ research ethics committee. General information sheet and a consent form about the study were provided to students in the four cohort groups. The consent form informed the participants that all collected data would be treated as confidential and anonymity will be adhered to as an added proviso.

Statistical analysis

The demographic variables were summarised using frequency distributions and percentages. Data from the learning styles questionnaire for each student was scored and plotted on a grid to determine
the student’s learning styles preference (LSP). The means and standard deviations were determined for all the variables. Paired t-tests were used to examine the differences between pre- and post-test scores of knowledge, attitude and intervention confidence skills. The influence of learning styles preference on educational outcomes was determined by analysis of covariance (ANCOVA and Bonferronic post hoc test. A series of analysis of covariance (ANCOVA), a combination of ANOVA with regression, were carried out to measure the differences among group means of knowledge, attitude and intervention confidence and to control for threats to the internal validity of the study. The advantages that ANCOVA has over other techniques are the ability to reduce error variance in the outcome measure and the ability to measure group differences after allowing for other differences between subjects’ (Munro, 2004, p. 187).

In the present study, the pre-tests mean scores of knowledge, attitude and intervention confidence were chosen as covariates. Thus, using the pre-tests acted as covariates provided a baseline for the statistical validity of the study.

**Results**

The sample consisted of 110 subjects with 47 (43%) male and 63 (57%) female. The mean age of the subjects was 32.9 (SD = 7.98) with a range of 20–55 years. Forty-five subjects (41%) were White, 49 were Black African and Caribbean (45%) and 16 (15%) were Asian and Other. The educational attainment of the subjects ranged from GCSE to university degrees. Forty nine subjects (45%) had GCSE O’ + A’ levels, 34 students (31%) had a diploma and 27 (25%) had a university degree. Table 1 shows the demographics of the sample.

**Table 1** Demographics of sample (n = 110)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Age range = 20–55</td>
</tr>
<tr>
<td></td>
<td>Mean age = 32.91</td>
</tr>
<tr>
<td></td>
<td>SD = 7.98, n = 110</td>
</tr>
<tr>
<td>Gender</td>
<td>Male = 43%</td>
</tr>
<tr>
<td></td>
<td>Female = 57%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>White = 40.9%</td>
</tr>
<tr>
<td></td>
<td>Black (African and Caribbean)</td>
</tr>
<tr>
<td></td>
<td>Asian and other = 14.5%</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single = 44.5%</td>
</tr>
<tr>
<td></td>
<td>Married = 34.5%</td>
</tr>
<tr>
<td></td>
<td>Separated = 5.5%</td>
</tr>
<tr>
<td></td>
<td>Divorced = 6.4%</td>
</tr>
<tr>
<td></td>
<td>Cohabiting = 9.1%</td>
</tr>
<tr>
<td>Educational attainment</td>
<td>GCSE and A level = 44.5%</td>
</tr>
<tr>
<td></td>
<td>Diploma/HND = 30.9%</td>
</tr>
<tr>
<td></td>
<td>Degree = 24.5%</td>
</tr>
</tbody>
</table>

Fig. 1 summarises the distribution of the students’ dominant learning styles preference. The analysis of the frequencies of the learning styles preference data revealed that the reflector group was highest category (n = 48–43.6%). The activist category, which included 18 (16%) students, represented the second highest number of students in that 4-category learning style preference.

Moreover, the interesting phenomenon about the distribution of the learning styles preference is the additional “dual” learning style category. Subjects whose scores were highest in two categories and classified in the strong and very strong preference were placed in the “dual” learning style category. Thirty-three subjects (30%) of the subjects were classified as having a “dual” learning styles preference, making this the second largest learning styles group in the sample. In the present study, the reflector—theorist learning styles group contributes to about 48% of the bimodal learning styles preference. This is followed by the theorist—pragmatic (18%) bimodal learning styles preference (see Fig. 2).

The results also showed that there were significant differences between the pre-test and post-test knowledge mean score ($t = -4.61, df = 109, p = .000$); between the pre-test and post-test attitude score ($t = -2.356, df = 109, p = .020$); and between the pre-test and post-test of intervention confidence skills ($t = -9.754, df = 109, p = .000$). In order to test the hypothesis that students grouped by their dominant learning styles preference will determine their knowledge acquisition, changes in attitude and intervention confidence skills, the five learning styles preference (activist, reflector, theorist, pragmatist and dual) were collapsed into three main categories. This was performed to aid the analysis of the data as the total number of theorist learning styles preference was $n = 6$, pragmatist $n = 5$. It was deemed necessary to have three main categories with sufficient numbers in each category to enable statistical analysis. However, this does not distract from testing the hypotheses. The three new categories were: reflector, dual and a combination of activist—theorist—pragmatist (APT). The results indicated that, after controlling for the covariates, learning styles preference had no influence on knowledge acquisition ($F(2,106) = 2.645, p = .076$), a attitude change.
The findings showed that reflectors learning styles represent the highest proportion of the dominant 4-category learning styles preference (44%), followed by the activist learning styles (16%) and in diminished frequency the theorist learning styles (5%) and pragmatic learning styles (5%). The findings from this study that the undergraduate nursing students’ dominant learning styles preference is the reflector dimension are consistent with results from previous nursing studies (Cavanagh and Coffin, 1994; Alonso, 1992; Pérez et al., 2005). Studies with medical practitioners, using the Honey and Mumford Scale (1986) found that reflective learning styles was the predominant styles preference (Lesmes-Anel et al., 2001; McCall et al., 2005). Despite the differences in terms of the nature of the sample, the time lapsed between the various studies reported and the educational and psychosocial context, similar results have been obtained compared to the present study. The reflector learning styles seems to be the predominant learning styles preference.

The identification of a "dual" learning styles preference was an unexpected finding from this study. In this study about 30% \((n = 33)\) of the total sample were classified as having a "dual" learning styles preference. The phenomenon of dual learning styles preference was documented in only one nursing study, using Kolb’s LSI. Thirteen percent of the sample was identified with this dual characteristic (O’Brien and Wilkinson, 1992). In a recent study with physical therapy students, Olson (2000) found that about 34% of the sample \((n = 190)\) were categorised as having a "dual" learning styles. Studies with general practitioners had also observed the dual learning styles preference, mainly the "reflector–theorist" preferred style (Lesmes-Anel et al., 2001; McCall et al., 2005). In this study, the reflector group is not only the predominant learning styles preference but also part of the most identified "reflector–theorist" in the dual category. The findings of the predominant reflector–theorist learning styles group within the bimodal learning category are congruent with findings of studies with medical practitioners (Lesmes-Anel et al., 2001; McCall et al., 2005).

These dual learning styles may be attributed to nature and characteristics of this undergraduate nursing student sample. These ‘age-mature’ nursing students may have learned to be adaptive in their teaching and learning experiences and have developed multi-dimensional skills to meet the demanding requirements of the course. The findings of the dual learning style group may also be
congruent with the contention that nurses are both 'people orientated' (reflector) and 'scientific' (theorist). The results of this study also support (Kolb, 1984) claim that no one learning environment is orientated towards just one of the four learning modes. Kolb (1984) stated that an effective learner is able to apply skills from each of the learning modes in whatever combination the learning situation requires. The 'integration' of all four modes of learning into an individual's repertoire, however, is a developmental growth process (Kolb, 1984). It is apparent from the findings of this study that, given the fact that the mean age of the sample was 33, some of the students may have integrated their learning styles or to reach the 'integration' stage of their development.

The multi-layered hypothesis that learning styles preference will influence knowledge acquisition, changes in attitude and intervention confidence was rejected. However, a statistically significant influence of learning styles preference (single-layer hypothesis) on intervention confidence ($F_{(2,106)} = 6.915$, $p = .002$) was observed.

There may be some plausible explanations for the notion that dual learning styles preference group had some impact on the educational outcome of intervention confidence skills. First, students with a dual learning styles preference, with multiple learning skills, may have the ability to adapt their skills to the learning situation from the modes of their learning styles preference. The second plausible explanation the type of teaching and learning activities in the form of experiential learning (small group activities) and short-lecture methods may be more suited to the dual learning styles group than the reflector and activist—theorist—pragmatist group. There is evidence to suggest that divergers (reflectors) have a preference for interpersonal, group-orientated learning activities (Olson, 2000). A third explanation may be due to the fact that nurses' preferred learning styles varied according to subject area studied. The findings from Sutcliffe (1993) study suggested that there is a change in learning styles as different subjects are studied. Thirdly, that it may also be feasible that other intervening variables such as their educational background, the intuitive aspects of their personality or 'emotional intelligence' of the students may have influenced this educational outcome. The final plausible explanation may result from the fact that the assessment tool may be accommodating to the dual learning styles group compared to the reflectors or activist—theorist—pragmatist group. It is conceivable that the dual learning styles group have the capacity to adapt their learning strategies to a particular type of assessment. The measure of intervention confidence skills was based on a visual analogue scale which is rather unusual in educational assessment of learning.

The rationality of testing broad hypotheses about the relationship between learning styles and achievement scores in higher education undergraduate programmes has been articulated by Van Zwienenburg et al. (2000) and by Zywno (2003). They pointed out that there is potentially large number of interactions between students' learning styles and intervening variables which are likely to confound attempts to identify any singular effects of the student's learning styles, as measured by general learning style inventories. Some of these intervening variables relate to the educational outcome expectations and the variety of teaching styles which a student is exposed during the course of an undergraduate programme. However, it is fair to conclude that, among this sample, the learning styles questionnaire (LSQ) is not a useful tool for predicting knowledge acquisition or changes in attitude. Whether this lack of association is due to inherent limitation in the Honey and Mumford's learning styles preference model, validity of the assessment or measurement methodologies, or the unique characteristics of the sample is unclear. The latter explanation is at least plausible given the unexpected high proportion of undergraduate nursing students exhibiting the dual learning styles preference.

**Study limitations**

A methodological consideration is the nature of the sample itself. This sample of students has elected to undertake the mental health branch of the nursing educational programme. This 'self-selected' group of students may be different in personality, interest and motivation in working with alcohol and drug misusers compared to those following other specialist branch of nursing. Thus, the generalisations of these findings to other undergraduate nursing students are limited. The choice of educational institutions for the experimental sites was determined by accessibility and willingness to participate in the study. The collection of data during formal attendance to a wider educational programme, student motivations, module's assignments and the personality and teaching styles of those delivering the educational programme may serve as potential limitations. Educational outcomes may be attributed to multiple experiences. The Honey and Mumford's learning styles questionnaire was not tested for reliability in this study as
the authors reported internal consistency reliability coefficients of 0.89. However, any discrepancies in reliability would certainly affect the validity and therefore the generalisation of the findings. In addition, limited recent research data research on undergraduate nursing students are available using the Honey and Mumford’s learning styles questionnaire with which to make comparisons.

Conclusion

In the context of the study, the learning styles questionnaire shows the potential in predicting educational outcome in the intervention confidence skills domain. Further research is warranted, with larger sample sizes, to replicate this study using the same methodology but with several different population samples specialising in different branch of nursing. The learning styles preferences should be measured by two equivalent validated instruments to discern if they yield similar results. As there is limited literature on the dual learning styles preferences, this dual preference phenomenon needs further investigation to establish its acceptability in nursing education. In addition, the ‘adaptive’ strategies or multiple skills of the dual learning styles warranted further investigations on their influence on educational process and outcome.

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