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## Profiling sports therapy students preferred learning styles within a clinical education context

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### ***Abstract***

The aim of this study was to report the learning style preferences of final year Sports Therapy students within the context of clinical education, with a further specific focus on differences between male and female learning styles. A total of  $n = 32$  BSc. (Hons) Sports Therapy degree students ( $\bar{x} \pm s$ ; age =  $21.8 \pm 4.8$  years, male:female = 14:18) were recruited from the University of Gloucestershire whilst completing a 24 week clinical practice module. Data collection involved the Kolb learning style inventory (version 3.1) being administered to all participants with reference to their clinical practice experience. Data analysis, involving mean scores for these learning style orientations, were then used to determine the group preference for abstractness over concreteness (AC-CE) and action over reflection (AE-RO). Group analysis revealed a preference for the converging learning style (AC-CE = 5.3, AE-RO = 5.2) and was in contrast to the favoured individual learning styles of Accommodator (34%) and Diverger (31%). These individual findings are consistent with Kolb & Kolb's (2005) belief that individuals involved in human-related professions are person orientated and likely to adopt concrete learning styles. Gender comparison revealed a statistically significant difference between the AC-CE scores ( $P = 0.03$ ), possibly leading to the assumption that male Sports Therapy students have a predilection for more abstract modes of experiential learning (8.6), whereas females have a slight preference for more concrete means (2.7), suggesting a more balanced learning style. The findings of this study indicate that learning activities could be tailored in order to optimise potential learning within a clinical Sports Therapy context.

**Keywords:** learning styles; Kolb; student; undergraduate; sports therapy

## ***Introduction***

The aim of teaching is to facilitate the learning process and to develop students' competencies within their chosen field through meaningful goal-orientated activity (Ramsden, 1992; Mosston and Ashworth, 2002; Rink, 2002). The idea that people learn differently is revered within many educational systems and has its origins in ancient Greece (Wratcher, et al. 1997; Chia, 2011; Taylor and Walton, 2011). Many educators are now occupied with the idea that students have a pre-determined preference for particular sensory inputs, learning conditions and learning strategies (Linares, 1999; Neuman and Bekerman, 2001). These learning styles have been argued to be a key construct in the educational achievement of students (Coffield et al., 2004a), and have been further suggested to be mediated by gender (Sadler-Smith et al., 2000). Teachers must therefore be aware and have knowledge of the learning style preferences of their students (Anderson and Adams, 1992). Indeed, Nelson et al. (1993) have reported that higher academic results are achieved by students who have been tested on their learning style and provided with an instructional session on how to apply their subsequent strengths and weaknesses. As the emphasis on access, diversity, retention rates and life-long learning continues to increase within higher education establishments, there is an evident benefit to incorporate strategies to reach students based on learning style preference. The critics of learning styles do argue that learning styles are only one of a host of influences on learning and are unlikely to be the most significant (Furnham et al., 1999; Coffield et al., 2004b). Furthermore, due to the number of different learning style dichotomies, there is a lack of accumulated theoretical coherence and an absence of replicated findings which, if not addressed, will continue to produce more disorganised proliferation (Coffield et al., 2004b).

Within the discipline of Sports Therapy, clinical education is seen as an integral part of the teaching process as it permits the development of competent practitioners who are able to function successfully within this specialty (Hobbs et al., 2000). Indeed, Sanford et al. (1993) argue that this is the most important element of vocational healthcare programmes. Within the Sports Therapy discipline strategies are therefore required that improve students learning during clinical education and ensure that they achieve clinical competency.

This study reports the learning style preferences of final year Sports Therapy students within the context of clinical education, with a further specific focus on differences between male and female learning styles due to the interpretation that learning styles may also be gender specific (Brew, 2002). An understanding of this phenomenon will promote a means by which to improve the learning process by allowing teaching to be presented in a way that is most conducive to the students' needs, as well as highlighting areas where clinical teaching may be adapted.

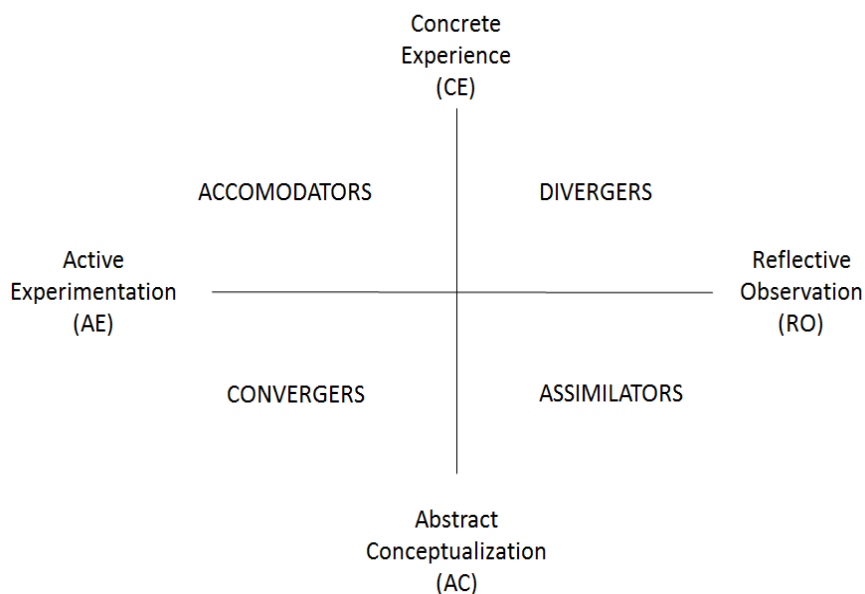
### ***Concept of learning styles***

Over the years the concept of learning styles has saturated the personalised learning agenda where an understanding of these styles, can allow teachers to exploits pupils' strengths and build their capacity to learn (DfES, 2004; Hauer et al., 2005). Within modern educational institutions the idea that teachers should pay close attention to the learning styles of their students carries a strong intuitive appeal (Coffield et al., 2004a). However, the application of this paradigm is often inconsequential as the utilisation of a wide variety of teaching methods is often seen as an effective means by which to support each student's individual learning preference. Although such a method would seem cogent, a teacher who adapts their teaching to satisfy four different learning styles will only accommodate a student's individual learning style preferences for 25% of the time. Assuming that learning is enhanced by this learning style accommodation, the student will actually be disadvantaged for the remaining 75% of the time, inevitably leading to a reduction in knowledge assimilation and comprehension, as well as learning and assessment performance (Torrance and Rockenstein, 1998).

Studies in learning styles originally developed as a consequence of interest in the relationship between individuals and their ways of learning. This attention has seen a vast amount of research conducted on all aspects of learning styles, with a large proportion referring to the higher education setting (Baykan and Nacar, 2007; D'Amore et al., 2012; Milanese et al., 2013). However, a host of empirical and conceptual problems appear to arise once the apparently unproblematic and straightforward appeal of learning styles is analysed. Such problems include conflicting assumptions regarding learning and the division of the learning styles field among theorists (Coffield et al., 2004b).

To understand how individuals learn, a number of learning theories have been proposed. These theories can be characterised into three domains based upon their principal theoretical framework (Hung, 2001). Behaviourist theory focuses on the aspects of learning that are observable and is based upon stimulus-response theories, whilst cognitive theories place emphasis upon brain-based representational learning. The view that learning is a process by which learners actively construct new ideas and concepts forms the basis for the constructivist theory (Brandon and All, 2010), which forms the basis for Experiential Learning Theory (ELT). Herein, learning is seen as a recursive cycle in which knowledge is created through the combination of grasping and transforming experience (Kolb, 1984). The foundation for Kolb's Learning Styles Model and the development of the Learning Styles Inventory (LSI) is made possible by this combination of experience, cognition, perception and behaviour (Kolb, 1984; 1985). Moreover, Kolb's LSI was created to serve both as an educational tool to increase an individual's understanding of the learning process and their unique approach to learning and to provide a research tool for investigating experiential learning theory (Kolb and Kolb, 2005). Success of this model can be gauged by the fact that in 2000, a bibliography of research was produced that documented over 1000 studies incorporating the LSI and associated theory (Mainemelis et al., 2002). However the experimental research base for the initial model was small and, as such, there are critics who maintain that the model is too narrow and underdeveloped (Heron, 1992; Reijo, 2000).

The Kolb LSI is a self-reported questionnaire that was developed from Kolb's cyclical learning process model and comprises four learning modes: concrete experience (CE); abstract conceptualisation (AC); reflective observation (RO) and active experimentation (AE) (Walklin, 2002). Within the 12-point questionnaire, questions follow a forced choice rank-order structure, where respondents are asked to rank four sentence endings in a way that best describes their learning styles. Scores are then summed across statements to derive a total for each of the four modes of learning (Highhouse and Doverspoke, 1987). By crossing the perception continua (CE and AC) with the processing continua (AE and RO), four types of learning are identified: Divergers (CE and RO); Assimilators (AC and RO); Convergents (AC and AE) and Accommodators (CE and AE) as shown in Figure 1 (Jonassen and Grabowski, 1993). The relative emphasis placed on these learning style orientations is the focus of the LSI measurement (Kolb, 1985).

**Figure 1. Kolb's Learning Styles (adapted from Kayes et al., 2005).**

Kolb claims that learning styles have a significant role in at least five main areas: behaviour/personality; educational specialisation; professional career; current job and adaptive competencies. The idea that educational experiences shape learning styles is argued by Kolb (1984) and, as such, it should not be surprising to find correlations between learning styles and educational specialisation (Kolb and Kolb, 2005). Indeed Kolb (1984) asserts that people choose fields that are consistent with their learning styles and are further shaped to fit the learning norms of their field once they are in it. Within the Sports Therapy discipline, clinical education is heavily influenced by experiential processes as it requires students to construct and assimilate theoretical and practical knowledge through clinical practice experience. As such, it could be expected that an overarching learning characteristic would be present among Sports Therapy students. However, the concept of learning styles is not a fixed personality trait and students' learning style preferences may change substantially as they mature from adolescence into adulthood (Coffield et al., 2004b). This assertion leads to the argument as to whether a rigid assessment tool such as the LSI can be used to measure a dynamic personality state. In answer to this Smith et al., (2002) state that the LSI is based on the assumption that learning styles, if not a fixed characteristic, are at least relatively stable over time, whilst Garner (2000) advocates that there is a marked tendency, in practice and research,

to treat learning style as a fixed personality trait. Such advocacy allows learning styles to be measured and studied in order to develop appropriate teaching and learning strategies.

Empirical investigations into the use of the LSI in evaluating the relationship between learning styles and teaching methods have produced some interesting findings: both McNeal and Dwyer (1999) and Buch and Bartley (2002) found that matching teaching mode to the learner's individual preference yielded no significant results. Indeed Buch & Bartley (2002) concluded that, regardless of learning style, all learners prefer the traditional face-to-face classroom approach to learning. Conversely, previous research by Katz (1990) and Sein and Robey (1991) produced disparate results, with the latter concluding that performance can be enhanced by tailoring instructional methods to accommodate individual learning style preferences. However the legitimacy of Katz's claim needs to be certified, as it did not apply to basic knowledge but instead high order cognitive outcomes, whilst Sein and Robey (1991) did not utilise a control group or give an indication to the magnitude of the effect. Additional studies into the use of learning styles to enhance academic achievement have shown the validity of understanding student learning style preferences. Indeed, many studies (Nelson et al., 1993; Lenehan et al., 1994; Rochford, 2006) have reported that students who were provided with instructional sessions regarding how to apply their strengths and weaknesses based on their individual learning style achieved higher academic results and grade point averages than their peers. Furthermore Sandmire and Boyce (2004) found that significant improvement in simulated clinical case exercise performance was elicited when students were mismatched based on learning style. An understanding of the individual learning styles of Sports Therapy students may therefore improve the development, design and delivery of educational programmes that aid the integration and application of students' professional knowledge (Brown et al., 2009). Within the context of clinical education this is of particular importance due to the challenges being faced within the education of health professionals: these include difficulties in attracting appropriate clinical educators; limited availability of clinical education placements and the reduction in government funding for health and education (Hobbs et al., 2000).



## **Methods**

### **Participants and recruitment**

A total of 32 final year BSc. (Hons) Sports Therapy degree students ( $\bar{x} \pm s$ ; age = 21.8  $\pm$  4.8 years, male:female = 14:18) were recruited from the Sports Therapy Clinical Practice module that involved students completing 24 weeks of practice within a clinical environment. The sample represented 97% of the total final year Sports Therapy cohort (32/33) and the male to female ratio for this cohort was split 14:18 (44%:56%) respectively. Sampling included participants who were all over 18 years of age and who agreed to act as participants for the study by giving their written informed consent. Before commencement of the study all participants were given an information sheet that detailed the aims of the study and the procedures involved, including competence, voluntarism, full information and comprehension (Cohen et al., 2007). They were also aware of their right to withdraw at any time and that their data would be kept confidential and anonymous. All data was collected and stored in compliance with the Data Protection Act (1998).

### **Data collection procedures**

The Kolb learning style inventory was administered (version 3.1) to all participants. All participants were asked to complete the learning style inventory with reference to their clinical practice experience. The learning style inventory was completed without the researcher present to minimise researcher bias (Oppenheim, 2000).

### **Data analysis**

Summary results, including mean and standard deviations (SD), were calculated for each of the four learning style orientations (i.e. AC; CE; AE; RO) using Microsoft Office Excel (version 2010). Mean scores for these orientations were then used to determine the group preference for abstractness over concreteness (AC-CE) and action over reflection (AE-RO). Independent samples t-tests using an alpha level of 0.05 were conducted with respect to group learning style preferences and gender differences for the perception and processing continua using Microsoft Office Excel (version 2010).

## Results

A total of 32 students (mean age 21.8 years, range 20-47 years, SD 4.8 years) took part in the study, representing 97% of the total final year Sports Therapy cohort (32/33). The male to female ratio for this cohort was 14:18 (44%:56%). The mean scores and standard deviations for the four learning style orientations upon which the LSI is based are presented in Figure 2.

**Figure 2. Learning styles inventory scores for the four learning style orientations for n = 32 undergraduate Sports Therapy Students.**

	<b>CE</b>	<b>RO</b>	<b>AC</b>	<b>AE</b>
	$\bar{x} \pm s$	$\bar{x} \pm s$	$\bar{x} \pm s$	$\bar{x} \pm s$
<b>Male</b> <b>(n = 14)</b>	20.1 $\pm$ 4.9	33.5 $\pm$ 5.9	28.7 $\pm$ 7.2	36.3 $\pm$ 7.5
<b>Female</b> <b>(n = 18)</b>	22.9 $\pm$ 4.8	31.5 $\pm$ 7.1	25.7 $\pm$ 4.8	38.6 $\pm$ 4.2
<b>TOTAL</b> <b>(n = 32)</b>	21.7 $\pm$ 5.0	32.4 $\pm$ 6.6	27.0 $\pm$ 6.0	37.6 $\pm$ 5.9

### KEY:

CE: concrete experience; RO: reflective observation; AC: abstract conceptualisation; AE: active experimentation.

The group learning style characteristics for the perception and processing continua were calculated from the group mean scores for the relevant learning style orientation (AC-CE and AE-RO) are illustrated in Figure 3. A statistical analysis of these orientations revealed a statistically significant difference for AE-RO ( $p < 0.001$ ) and AC-CE ( $p < 0.001$ ). The LSI data for each separate participant was also used to identify distinct learning styles and the number of participants within each learning style category.

**Figure 3. Learning styles inventory scores for perception and processing continua and preferred learning styles for n = 32 undergraduate Sports Therapy Students**

	AC-CE	AE-RO	Ass	Acc	Con	Div
<b>Male</b> (n = 14)	8.6	2.8	7 (50%)	4 (29%)	1 (7%)	2 (14%)
<b>Female</b> (n = 18)	2.7	7.1	0 (0%)	7 (39%)	3 (17%)	8 (44%)
<b>TOTAL</b> (n = 32)	5.3	5.2	7 (22%)	11 (34%)	4 (13%)	10 (31%)

**KEY:** Ass: Assimilator; Acc: Accommodator; Con: Converger; Div: Diverger.

Specific data for each gender was also calculated due to the potential influence that gender may have on learning style preferences. A statistical analysis of the genders revealed no significant differences between the genders for CE ( $p = 0.11$ ), RO ( $p = 0.42$ ), AC ( $p = 0.16$ ), AE ( $p = 0.27$ ), or AE-RO ( $p = 0.21$ ). However, statistical significance was obtained for gender comparison of the AC-CE scores ( $p = 0.03$ ).

## **Discussion**

In the present study, the Kolb LSI was used to examine the learning style preferences of undergraduate Sports Therapy students within a clinical education setting. LSI scores revealed that when gaining experience the cohort showed a preference for abstractness (AC-CE = 5.3, range -14 to 19,  $p < 0.001$ ). When reflecting upon these experiences the students reported a preference for action (AE-RO = 5.2, range -9 to 22,  $p < 0.001$ ). These findings are in agreement with those obtained in other studies that have focussed upon the learning style preferences of students from various health professions (Hauer et al., 2005; Brown et al., 2008; Zoghi et al., 2010; Milanese et al., 2012). An important factor is that none of these studies focussed upon specific areas of health professional education, thereby suggesting that the preference for abstractness and action described within the current cohort may be relevant to other aspects of the Sports Therapy programme.

When perceiving information, Sports Therapy students are more likely to prefer to first learn from a theoretical perspective as opposed to developing their learning through situational experience, allowing them to contemplate the problem at hand before actually experiencing it (Joy and Kolb, 2009). However, when transforming this experience into knowledge, results indicated that students preferred to utilise active practice with real clients, as opposed to observing others. A preference for AC and AE learning styles suggests that the Sports Therapy students within the current cohort have a converging learning style. During clinical education students are required to attend to clients whilst having their performance assessed by a clinical educator. The converging style allows students to provide a focussed answer to a question or problem. Indeed these learners are best at finding practical uses for ideas and theories and prefer to experiment with simulations and practical applications that can be found within the clinical environment (Kolb and Kolb, 2005). However, although the converging learning style can be shown to be the prevailing learning style based upon the group analysis, the learning style preferences for each individual student actually reveals this to be the least preferred style. The reason for this may be due to the wide variation in scores within the data set (see Figure 2). When global averages are calculated, these variations may have skewed the results to reveal mean scores that are not representative of the population studied (Field, 2009). The favoured individual learning style was actually that of Accommodator (34%) and Diverger (31%) (Figure 3). These findings are in contrast to other studies by Hauer et al., (2005), Brown et al., (2008) and Milanese et al., (2012), involving health professionals, which reflect a low preference for the Divergent learning style. However these findings are in accord with a number of studies involving health science students and professionals who have determined that the Divergent and Accommodator learning styles were the preferred learning style among undergraduate paramedic students (Smith, 2010; Zoghi et al., 2010; Williams et al., 2013). They conclude that Divergent individuals prefer to work in groups, listen with an open mind, and receive personalised feedback, whilst Accommodators are characterised as hands on learners. This is consistent with Kolb and Kolb's (2005) belief that individuals involved in human-related professions are person orientated and likely to adopt concrete learning styles.

Although statistical analysis of the LSI scores revealed no differences between the genders for the majority of their learning style preferences, the comparison of the AC-CE scores did reveal a statistically significant difference ( $p = 0.03$ ). The male Sports

Therapists in the group demonstrated a predilection for more abstract styles of experiential learning (8.6), whereas the females had a very slight preference for more concrete means (2.7). This potentially indicates a more balanced learning style for female students within the study cohort. Previous research by Brew (2002), Bowman et al., (2003) and Jones et al., (2003) on the learning styles of males and females has identified some substantial differences that are in contrast to the current findings. Brew (2002) argued that males displayed a preference for CE over AC, but that this predilection was not as mutually exclusive as that observed for females. However, research by Jones et al., (2003) concluded that learning styles are subject area specific, suggesting that there is an interaction between gender and educational choice. As such, findings from the studies by Brew (2002) and Jones et al., (2003) must be interpreted with care as it is difficult to establish how much of the learning style variance is attributed solely to gender, and how much is a function of educational choice (Willcoxson and Prosser, 1996; Kolb and Kolb, 2005). A study by Bowman et al., (2003) on a cohort of 212 physical therapy students and professionals reported a preference of the female participants for the Assimilator learning style, whilst the males in the group demonstrated a Converger learning style. This is in contrast to the existing study, where males exhibited a preference for the Assimilator style, whilst females had a relatively even split between the Accommodator and Diverger styles. These differences may be explained as the previous studies findings were related to general educational learning as opposed to having a specific focus on the clinical education context.

## **Conclusions**

Results of this study show that a wide variety of learning styles are evident within the studied cohort. However, there is statistical evidence of a predominance in learning styles that may be exploited through effective teaching and learning strategies. The use of Kolb's theory to ascertain learning style preferences is still open to critique. For example, the process of learning involves individual choice and decision-making, as well as personalised goals, intentions and purposes (Rogers, 1996). As such it is unclear where these elements would fit into Kolb's learning cycle. As for the inventory itself, one of its greatest limitations is that the results are based purely on how the learners rate themselves. These learning style preferences are also not measured through standards or behaviour, but merely through an individual's perception of how they behave. This is a

central problem for the LSI in that the ability to accurately measure an individual's experience of the world may be limited by errors in their own perception.

The findings of this study indicate that learning activities could be tailored in order to optimise potential learning. However, this is not to suggest that other styles of learning should be ignored or neglected as results from this study show that it is difficult to prescribe a predominant learning style to final year Sports Therapy students within a clinical education setting. Clinical educators of Sports Therapy students should therefore attempt to introduce a variety of teaching approaches and strategies in order to enable learning to occur regardless of students learning style preference. Providing specific educational sessions designed to teach students how to apply the strengths and weaknesses of their preferred learning style has been shown to augment academic achievement (Nelson et al., 1993). This may be a key method by which to enhance learning but does require more research into the effects within a clinical education environment.

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