Understanding the learning styles of undergraduate physiotherapy students

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Background. Undergraduate students at universities have different learning styles. To perform optimally, both they and their educators should be made aware of their preferred learning styles and problem-solving abilities. Students have different backgrounds, strengths, weaknesses, interests, ambitions, levels of motivation and approaches to studying and educators should therefore aim to become more aware of the diverse approaches to learning.

Objective. To identify the various learning styles and problem-solving abilities of physiotherapy students at the University of the Western Cape, South Africa.

Methods. Undergraduate physiotherapy students (*N*=246) who were registered for the 2012 academic year participated in the study. Three valid and reliable questionnaires, including the Index of Learning Styles (ILS), the Problem-Solving Style Questionnaire (PSSQ) and the Learning Style Questionnaire (LSQ), were used. Responses were analysed statistically to establish the association between learning styles and problem-solving ability.

Results. A response rate of 72% was reported (*n*=177). For first-, second-, third- and fourth-year students the response rates were 65/85 (76%), 53/67 (79%), 31/58 (53%) and 28/36 (78%), respectively. Forty-five (25%) participants were male, 124 (70%) were female and 8 (0.04%) did not indicate their gender. The prominent learning styles were feeling (PSSQ), kinaesthetic (LSQ) and visual-verbal (ILS). Males were prone to using the kinaesthetic learning style and females to a more visual learning style. The feeling group constituted 47% of the sample (39% males and 43% females).

Conclusion. The majority of students seem to learn by doing, although facts are important to them. It therefore might be important to first teach physiotherapy students concepts and then assist them to apply these in practice.

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Educational and cultural diversity are important factors to consider in undergraduate physiotherapy education. There are four principal aspects of student diversity, including learning styles, approaches to learning, orientation to studying and intellectual development.[1] For students to benefit most from their learning opportunities, they and the faculty should be aware of their learning styles and ability to solve problems.[2] Felder and Brent[1] state that students have different backgrounds, strengths, weaknesses, interests, ambitions, levels of motivation and approaches to studying. To enhance undergraduate physiotherapy education, educators should aim to become more aware of these diverse approaches to master new material.[3] Learning styles are a useful instrument to help students and researchers understand how to improve the way they learn and teach, respectively. Furthermore, it is important to know how students with different learning styles approach problem solving.

Learning styles or preferences are multifaceted ways in which learners perceive, process, store and recall what they are trying to learn.[4] Studies on preferred learning styles among physiotherapy students were primarily conducted abroad in developed countries such as Canada and Australia.[2,5] The Canadian study determined the learning styles and problem-solving abilities of physiotherapy students from their second to fourth year of a physiotherapy programme.[2] Results revealed that the preferred style of learning among students in the 4-year undergraduate physiotherapy programme was to study the theory and then reflect on or experiment with it. Their perceived problem-solving ability was similar to that of other undergraduate students, and was not related to their learning style.[2] The Australian study determined the learning style preferences among occupational therapy, physiotherapy and speech pathology students.[5] The authors reported that optimal learning environments should take into consideration how students learn. Although a consistent learning profile among this group of students could not be determined, the findings suggested that each profession attracts students with a range of learning styles. They highlighted the need to investigate correlations between learning styles, instructional methods, and academic performance of students in the health professions.

In the present study the learning styles of a group of physiotherapy students at the University of the Western Cape, South Africa were investigated. However, according to Felder and Brent,[1] it is not possible to tailor one's teaching to suit every learning style or to teach with a one-size-fits-all approach, expecting all learners to benefit.

Methods

Research design

The study employed a quantitative, cross-sectional research design. Cross-sectional studies are mostly used to determine prevalence; therefore this design was deemed appropriate.[6]

Participants

All registered undergraduate physiotherapy students (*N*=246) for the 2012 academic year at the University of the Western Cape were invited to participate (Table 1).

Data collection

Three questionnaires were used to collect the data, including the Index of Learning Styles (ILS), the Problem-Solving Style Questionnaire (PSSQ) and the Learning-Style Questionnaire (LSQ). The ILS was developed in 1991 and is based on the learning style model formulated by Felder and Silverman.[1] This questionnaire assesses preferences on four dimensions: active-reflective, sensing-intuitive, visual-verbal and sequential-global. The PSSQ places the student in one of four categories, i.e. sensing, intuitive, feeling or thinking.[7] In addition, the LSQ classifies the student into three possible groups, i.e. visual, auditory, and kinaesthetic learning styles.[8] All the questionnaires have been used in studies with similar population groups as the current study.

Data analysis

The data collected were captured and analysed using the Statistical Package for Social Science (SPSS) version 19.0. Descriptive statistics were used to summarise the frequencies of students in each learning style category and to determine whether the distribution of learning styles was different across the four years of the programme. Predominant race and gender were also determined. Inferential statistics using the independent sample test were employed to compare learning style scores across the four years of the programme and to analyse the association between learning styles and problem-solving ability.

Table 1. Number of students registered in the programme (*N*=246)

Year of study	Students, *n*	Male	Female
First	85	20	65
Second	67	16	51
Third	58	15	43
Fourth	36	11	25

Results

Demographic data

A response rate of 72% (*n*=177) was reported. For first-, second-, third- and fourth-year students the response rates were 65/85 (76%), 53/67 (79%), 31/58 (53%) and 28/36 (78%), respectively. Of the respondents, 45 (25%) were male, 124 (70%) were female and 8 (0.04%) did not indicate their gender. Of all participants who responded, 107 (60%) were coloured, 31 (18%) were white, and 26 (15%) were black. Thirteen students (7.3%) were grouped as 'other' and included Indians, Asians, and those who did not indicate their race.

Learning styles

An overview of the learning styles of the participants is presented in Table 2. Based on the results of the LSQ, more students were found to have a kinaesthetic learning style, followed by a visual learning style. Males seemed to prefer a kinaesthetic learning style ($p<0.05$), while females had a more visual learning style. There was no significant association between race and year of study and the learning styles.

In the ILS questionnaire, the visual-verbal aspect of the students' learning styles was more common (31%). In this category, females were more prone to this style of learning ($p=0.00$), and in the sequential-global category more males expressed a preference for this style ($p=0.00$). No significant gender and race differences were found between the other categories. In addition, there was a significant difference between senior-level (third- and fourth-year) and junior-level (first- and second-year) students, the former being more active-reflective learners.

The PSQ highlighted that the majority of students 75/177 (42%) were classified in the feeling group. However, there was no significant association with gender and year of study. Within the thinking group, there was a significant association between gender and thinking, with males being more inclined to think matters through than females ($p<0.005$). Although there was no significant association found between the learning styles and the problem-solving ability of the participants, there was an association between

Table 2. Overall problem-solving and learning style

No.	Questionnaire	Outcomes	Definition
1	**Problem- Solving Style Questionnaire**[7]		This questionnaire divides the group of students into 4 categories, i.e. sensing, intuitive, feeling and thinking
	Sensing	43/177	
	Intuitive	35/177	
	Feeling	75/177	
	Thinking	24/177	
2	**Learning-Style Questionnaire**[8]		This questionnaire groups students into three categories, i.e. visual, auditory and kinaesthetic
	Visual	64/177	
	Auditory	42/177	
	Kinaesthetic	71/177	
3	**Index of Learning Styles**[8]		This questionnaire assesses preferences in four dimensions (active/reflective, sensing/intuitive, visual/verbal, and sequential/global) of a learning style model. Visual learners remember best what they see, i.e. pictures, diagrams, flow charts, time lines, films, and demonstrations. Verbal learners get more out of words, i.e. written and spoken explanations. Everyone learns more when information is presented both visually and verbally
	Active-reflective	37/177	
	Sensual-intuitive	45/177	
	Visual-verbal	55/177	
	Sequential-global	40/177	

the kinaesthetic type of learning style and the problem-solving method of feeling (Table 3).

Discussion

The current study assessed the learning styles and problem-solving approaches of undergraduate physiotherapy students registered at the University of the Western Cape. The students who were registered for the programme came from diverse cultural and socio-economic backgrounds, as indicated in the results. In addition, they were found to be more practically orientated, but still needed both visual and verbal cues. Gender influenced the learning style, with males seeming to process information in different ways than females. Males seemed to use more of a thinking process. This differed from another study, which focused on the learning styles of entry-level physiotherapy students. The results showed that these students preferred to learn new material by reviewing, observing or thinking as opposed to actively doing or planning.[9]

In another survey, where gender and learning styles were assessed, there was a significant difference between the learning styles and gender.[10] The results of this study showed that styles leaning towards didactic teaching appealed more to males, as these are primarily abstract and reflective. It was also reported that females learned better in hands-on and practical settings, emphasising the sphere of the affective and doing. Therefore, the results of the study by Philbin *et al.*[10] show that when females are watching and feeling or doing and thinking they learn best, and when males are thinking and watching they learn best. Similarly, the current study reported that males tended to lean more towards thinking than females, who tended to be more visual. This indicates that females wanted to be stimulated visually by watching.

Kolb's theory states that a preferred learning style influences the problem-solving ability of a person.[2] Wessel *et al.*[2] further state that for students to make the most of their learning opportunity educators should be aware of their learning style and ability to solve problems. The study also assessed the learning style and problem-solving ability of students, and the results showed that there was no association between learning style and perceived problem-solving ability. The results from the current study were the same, even though more than one learning style questionnaire was used.

Similarly to what was found in the present study, the learning style preferences of first-year undergraduate occupational therapy students in Australia demonstrated a greater preference for kinaesthetic learning.[11] This may indicate a preference for learning through practice or simulation. Even though a range of learning styles were found in the Australian study, instructional approaches seem to be required.[11] In contrast, Mountford *et al.*[9] found that entry-level physiotherapy students preferred to learn new material by reviewing, observing or thinking as opposed to actively doing.

Conclusion

Based on the three questionnaires used it was demonstrated that the majority of the students learn by doing, although facts are important to them. Therefore, physiotherapy students may learn better if the concepts they are taught in theory are applied in practice. This is supported by the fact that the highest number of students fell in the kinaesthetic learning style category. To effectively utilise this learning style, the educator should provide the learner with real-life experiences and simulations.

Table 3. Association between problem-solving ability and learning styles (*N*=177)

	Problem-Solving Style Questionnaire			
	Thinking	**Intuitive**	**Sensing**	**Feeling**
Learning-Style Questionnaire				
Visual	8	12	17	27
Auditory	6	4	14	19
Kinaesthetic	10	19	12	29
Index of Learning Style				
Active-reflective	4	8	11	15
Sensual-intuitive	10	6	6	17
Visual-verbal	6	15	15	29
Sequential-global	4	11	11	14

Implications for practice

Lecturers should be aware of the different learning styles of students and address this either by changing their teaching practices or ensuring that their learning styles are used to their full effect. It is important to understand students and to be aware that they have different attitudes to learning. This should be used to create a teaching experience that will impact positively on the students' learning experiences and for finding a balance between the extremes in each learning dimension.[1,12] All learning style preferences cannot always be accommodated but awareness can help to enhance methods of teaching and thus methods of learning.

Limitations

It must be emphasised that these results are an indication of the students' learning preferences and an even better indication of the preference profile of a group of students (e.g. a class), but should not be over-interpreted.

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References

1. Felder R, Brent R. Understanding student differences. Journal of Engineering Education 2005;94(1):57-72.
2. Wessel J, Loomis J, Rennie S, Brook P, Hoddinott J, Aherne M. Learning styles and perceived problem-solving ability of students in a baccalaureate physiotherapy programme. Physiotherapy Theory Practice 1999;15:17-24. [http://dx.doi.org/10.1080/095939899307865]
3. Carmo L, Gomes A, Pereira F, Mendes A. Learning styles and problem solving strategies. Paper presented at the 3rd E-Learning Conference; 7 - 8 September 2006, Coimbra, Portugal.
4. Lujan H, DiCarlo S. First-year medical students prefer multiple learning styles. Advan Physiol Educ 2006;30:13-16. [http://dx.doi.org/10.1152/advan.00045.2005]
5. Brown T, Cosgriff T, French T. Learning style preferences of occupational therapy, physiotherapy and speech therapy students: A comparative study. The Internet Journal of Allied Health Sciences and Practice 2008;6(3):1-12.
6. Mann C. Observational research methods. Research design II: Cohort, cross-sectional, and case-control studies. Emerg Med J 2003;20:54-60. [http://dx.doi.org/10.1136/emj.20.1.54]
7. Duff A. Note on the Problem Solving Style Questionnaire: An alternative to Kolb's Learning Style Inventory? Educational Psychology: An International Journal of Experimental Educational Psychology 2004;24(5):699-709. [http://dx.doi.org/10.1080/0144341042000262999]
8. Cassidy S. Learning styles. An overview of theories, models, and measures. Educational Psychology: An International Journal of Experimental Educational Psychology 2004;24(4):419-444. [http://dx.doi.org/10.1080/0144341042000228834]
9. Mountford H, Jones S, Tucker B. Learning styles of entry-level physiotherapy students. Adv Physiother 2006;8:128-136. [http://dx.doi.org/10.1080/14038190600700278]
10. Philbin M, Meier E, Huffman S, Boverie P. A survey of gender and learning styles. Sex Roles 1995;32(7/8):485-494.
11. French G, Cosgriff T, Brown T. Learning style preferences of Australian occupational therapy students. Australian Occupational Therapy Journal 2007;54:58-65. [http://dx.doi.org/10.1111/j.1440-1630.2007.00723.x]
12. Montgomery S, Groat L. Student learning styles and their implications for teaching. In: Friesen E, Kristjanson C, eds. Teaching at the University of Manitoba. Winnipeg, Man: University Teaching Services, 1998;10:1-8.