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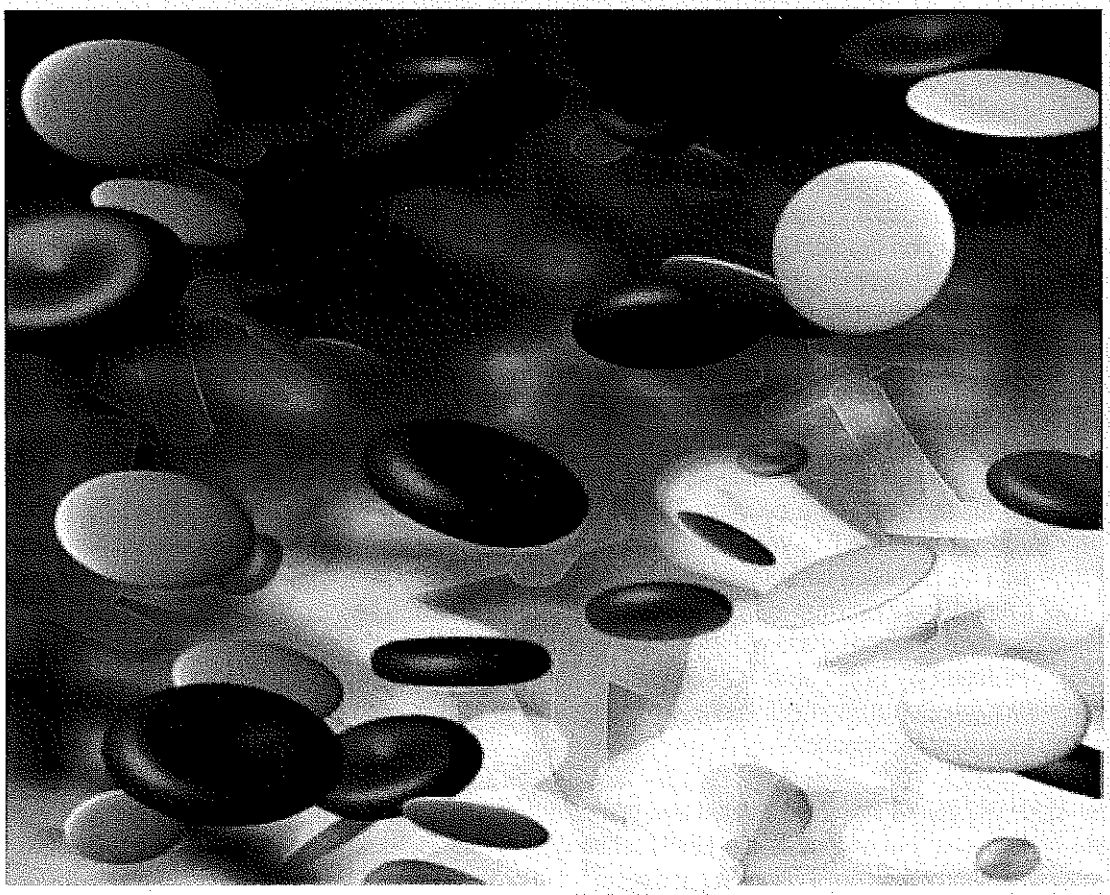

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LEARNING STYLE CHANGES IN CHIROPRACTIC STUDENTS MOVING FROM ACADEMIC LEARNING TO CLINICAL APPLICATION

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ABSTRACT

The transition period from basic science studies to full-time clinical studies, including the internship or preceptorship, is often a difficult time for students because of the differences and complexities between basic science knowledge and clinical circumstances. This is commonly seen with many students in a variety of health care programs including chiropractic.

This article reviews concepts which may aid educators in determining the most effective ways to help students transition from didactic learner to student-clinician. The paper reviews several theoretical concepts focusing on the application of student learning preferences and the pedagogical implications for how to best address these preferences in clinical training.

Keywords: *Learning Preferences, Learning Styles, Clinical Education, Chiropractic Education*

INTRODUCTION

Clinical education is a complex, multi-factorial, continuous process and is vital in the development and success of future health care delivery. These clinical education programs are underpinned by basic sciences delivered in the first years of all health profession programs. Yet some students continually struggle with the transition between academic knowledge and the clinical application of this knowledge. A recent report indicates that clinical education in Australia is marked by a lack of innovation and alternatives, and a lack of research into clinical education approaches and effectiveness (Bagot et. al., 2005). The report by Bagot et. al. (2005) commissioned by the Victorian State Government illustrates the need for a better understanding of the requirements of clinical education and how further research into this topic is of importance.

This study will investigate three related and interconnected themes. The first theme explores learning style preferences; the second is the identification of teaching styles and the third bridges these two domains to identify their implications for pedagogy.

It has been suggested that the ability of students to assimilate and understand material taught at university level may be a function of their own personal learning style and the teaching style of the "Professor" (Felder and Silverman, 1988). Several important dimensions contribute to the effectiveness of clinical education and learning. For example Knowles (1990) demonstrated one dimension through the utilisation of adult education principles and methods which included the creation of a supportive

learning environment. Other dimensions include problem-based learning (Barrows, 1980), experiential learning (Kolb, 1984), action learning (Dilworth, 1998), and reflective practice (Schön, 2004).

Another important dimension involved in clinical education is the transition from novice to expert. Rasmussen (1983) has developed a conceptual framework involving levels of skills performance. This concept involves the transition between explicit and implicit memory systems; however, it does not address how to help people move towards a particular expertise. With this in mind there is a need to identify the learning style preferences of chiropractic students in order to assist with transfer and application of theoretical and practical knowledge.

Dreyfus, Dreyfus and Athanasion (1986) opine that *knowledge based* or *pre-competent action* is cognitively effortful and time consuming and gives us clues about what we (as teachers) are looking for as students develop competent performance. The transition to competence is not so much about what they can recall (memory based assessment) but how they make use of this information. In addition it is also about the 'richness' of their conceptualisations, the capacity to integrate new, sometimes incongruent information, to cope with missing information, and the appropriateness of their responses to the situation in which they find themselves.

It has also been suggested that this movement from novice to expert is made possible by the development of an increasingly rich network of connections between modes of learning – declarative and non-declarative knowledge and procedural skills as alluded to above (Dreyfus, Dreyfus and Athanasion 1986). This network becomes increasingly 'automated' until it eventually occurs effortlessly (unconsciously competent). In becoming automated, it also becomes less accessible to conscious review or exposition. This may be one factor contributing to the challenge of the expert trying to teach the novice in that it may be a significant influence on the teaching styles of relevant academics.

We intend to investigate the elements of congruence and friction between learning styles and teaching strategies to better understand and improve the transition from basic sciences to clinical application in chiropractic students.

AIMS OF THE PROJECT

Using both quantitative and qualitative methods we aim to investigate:

- Changes in preferential learning styles in chiropractic students as they progress from academic to clinical components of their program.
- The concurrent teaching styles these students are exposed to as they progress from academic to clinical components of their program.
- Correlations between the student's final grades and learning styles inventory.
- Correlations between the student's final grades and the teaching styles to which they were exposed.
- Correlations or differences in the above between the Chiropractic program at Macquarie University, RMIT University and Murdoch University.

IMPORTANCE OF THIS STUDY

This project will investigate an important gap in the current literature regarding the transition from academic to clinical learning strategies in health care education as experienced by chiropractic students

in their undergraduate study programs. Chiropractic is an emerging health profession and its University presence is relatively new with the first cohorts graduating from Macquarie University and RMIT in the 1980's and from Murdoch University in 2007. Prior to this time chiropractic education in Australia was confined to private colleges and Institutes of Technology.

This project will compare learning and teaching styles in chiropractic undergraduate programs at the three University courses providing such programs.

To our knowledge no studies of this nature have been done in relation to chiropractic students. Chiropractic students are different in that they move from basic sciences to a "hands on" field involving manual therapies. Our hope is that this study will not only give clinical educators a better understanding of how clinical students learn but also inspire novel teaching approaches and curriculum designs that can be applied over wide spectrums of health education nationally and internationally.

The ultimate aim of this project is to improve the quality of learning and teaching by creating a congruent high quality educational environment which caters more appropriately to the diverse needs of today's students as they move between academic learning to clinical application in a health care setting. We note that the only previously funded Carrick project with a clinical theme funded in 2007 was awarded to Adelaide University and this revolved around Teaching Management Systems. There is no similarity in our two projects.

PROPOSED OUTCOMES AND DELIVERABLES

We will be able to categorise the learning styles of students and compare them to their respective results. We will also be able to compare teaching styles and compare them to students' results. In students who perform well we expect a positive correlation between teaching and learning styles, this may be a baseline attribute of students or a change that has occurred during the course of the program. In students who perform poorly we anticipate finding a mismatch between learning style and teaching styles. The non-congruence in teaching styles may be present from the outset or may be due to the student's inability to change their learning style as the program progresses or due to teacher's inability to accommodate the various learning styles in their teaching.

The key outcomes of this project will be:

- To improve learning styles to achieve an improved result for students and enhance graduate attributes through developing learning materials that cater for a wider range of learning preferences.
- To positively influence teaching styles to accommodate the differing student learning styles and thereby enhance students outcomes as students transition from basic sciences to clinical years
- From these results we envisage a long term change in learning and teaching styles at the three chiropractic programs involved in the study. In addition the knowledge creation from this project will be relevant and transferable to chiropractic programs worldwide.
- To increase our understanding of what constitutes an effective learning environment.

To support these outcomes evidence will be provided by the outputs of the action of the various participating Deans and impact of Unit development delivered by key academics. Impact will also occur by way of publication in journals.

Secondary outcomes will be improved assessment and learning activities influenced by the project findings. Longer-term outcomes, such as improved student motivation and satisfaction, and improved and deeper learning, are unlikely to be evident during the life of this project, but would be expected to start to appear in the last semester. Although longer-term outcomes are harder to demonstrate in the short term, it is expected that ongoing and sustainable curriculum development and delivery will be measured against the University's Strategic Plan Performance Indicators. In addition we intend to develop teaching and learning materials to address the increasing diversity of our respective student cohorts.

Deliverables will also include disseminating results from the project. This will not only include measurable outcomes discerned from the action plan via chiropractic program Deans but will also include process strengths and weaknesses uncovered in the evaluation process. The strategies of dissemination will include an interim report after 12 months, conference papers, publications and a full report of the outcomes and evaluation of the project to the Council on Chiropractic Institutions of Australasia (CCIA). The CCIA is a council formed by the Deans of all three Chiropractic programs in Australia as well as the President of the New Zealand Chiropractic College.

EVALUATING STUDENT LEARNING STYLES

Evaluating student learning styles as a tool to recognise and address student learning needs is an approach that has been successfully implemented at many universities across a wide range of disciplines (Alfonseca et. al., 2006; Montgomery, 1995; De Vita, 2001; Dee et. al., 2002). However, very few studies have focused on the area of clinical learning in the health care professions and we are unable to locate any studies in this regard specifically addressing chiropractic clinical learning. Although the previously mentioned studies do not focus on clinical learning, these studies clearly emphasise the need to adopt a multi-style teaching approach to engage a wider range of student learning styles. This approach may also help to increase the student's comfort level when utilising a less favoured learning style system (De Vita, 2001; Felder, 1993).

Translating specific ideas about learning styles into teaching and learning strategies is critically dependent on the extent to which these learning styles have been reliably and validly measured, rigorously tested in authentic situations, given accurate labels and integrated into everyday practices of information gathering, understanding, and reflective thinking. Our study intends to address these critical aspects by using both valid and reliable instruments and the authentic measurement of student achievement in both traditional written examinations and in performance of clinical skills as outcome measures.

The various approaches to learning strategies in the domain of cognitive processing have shown considerable overlap with student motivational dimensions, although little was known about the relations among regulatory activities and the way students used them until the work of Brown (1987) and Volet (1991). We have chosen the Inventory of Learning Styles (ILS) as our learning style instrument (Vermunt, 1996). Details are shown below.

APPROACH AND METHODOLOGY

We will explore three related and interconnected themes. The first theme explores learning style preferences; the second theme is the identification of teaching styles and the third theme bridges these two domains to identify their implications for pedagogy. To do this we will study (a) learning styles, (b)

teaching styles and (c) selected student grades of achievement in all three Australian Chiropractic programs. The programs are at Murdoch University (Five year full time double degree), Macquarie University and RMIT University (Both have a two year Masters after a three science degree). This Graduate entry to Macquarie and RMIT means that there will be a staggered research approach to data collection.

The research design is a cross sectional one. As such we make the assumption that each cohort is the same as each other. To study one cohort we would need to undertake a longitudinal prospective study over 5 years. This is not within the ambit of a Carrick grant. However, we foreshadow that the results of this study may lead us to continue on this pathway.

A) Determination of Learning Styles

At Murdoch University students entering each year from first to fifth will be asked to complete the reliable and valid inventory of learning styles (InvLS). At Macquarie and RMIT Universities students entering fourth and fifth year will be asked to complete the same instrument. In addition, we will administer the instrument to students towards the end of fifth year at all Universities.

Learning Style Measurement Tool

The Inventory of Learning Styles (InvLS), is an instrument aimed at measuring several components of student learning; namely, cognitive processing strategies, metacognitive regulation strategies, conceptions of learning, and learning orientations. It is based on phenomenographic analyses of interviews with university students about their ways of learning, their ideas about learning, studying and teaching, and their motives, concerns, and personal goals in their studies (Vermunt, 1996).
This tool was chosen for this study due to the robust validation and reliability processes that it has endured (Coffield et. al., 2004). The ILS is readily available to all of the participants and all of the collaborating partners are familiar with the tools. This outcome measure will determine:

- Changes in preferential learning styles in chiropractic students as they progress from academic to clinical components of their program

The student's final grade in each course will also be tested for association with the learning style utilised by the student.

B) Determination of Teaching Styles

Over the course of their degrees chiropractic students are exposed to a variety of teaching styles and strategies that aim to deliver academic and clinical content. We need to determine the types of teaching styles to which students are exposed in order to ascertain whether the teaching style matches the student's identified learning styles.

(i) Academic teaching style

Academic teaching style refers to the distinct qualities displayed by a teacher that are persistent from situation to situation regardless of the content. Teaching style is broader than the immediate teaching strategies that are employed to accomplish a specific instructional objective, it cannot be determined by looking at one isolated action of the teacher. To identify one's style, the total atmosphere created by the teacher's views on learning and the teacher's approach to teaching must be examined. Because teaching style is comprehensive and is the overt implementation of the teacher's beliefs about teaching,

it is directly linked to the teacher's educational philosophy (Conti, 2004). While several philosophical schools exist, they differ in the instructor having either a teaching-centred or learner-centred teaching style. It is these two styles which we will determine in the academics teaching chiropractic students.

The instrument we have chosen is the Principles of Adult Learning Scale (PALS). This 44 item validated instrument measures the frequency with which one practices teaching/learning principles. High scores on PALS indicate support for a learner centred approach to teaching. Low scores reveal support for a teacher centred approach. Scores in the middle range disclose an eclectic approach that draws on behaviours from each extreme.

This instrument will be administered to all academics teaching units to chiropractic students from years 1 to 5 at Murdoch University and from years 4 to 5 at Macquarie and RMIT Universities.

(ii) Clinical teaching styles

Students of chiropractic are supervised in a University clinical environment by clinicians who are generally brought in from the field. They are not usually trained teachers but rather skilled and experienced practitioners and have a unique teaching style. In clinical medicine, as in teaching, there is no one right way; clinical teachers can adapt their styles to reflect the situations that arise. Like academics clinicians can also be classified broadly as teacher-centred or student-centred in their approach (Langlois and Thach, 2001). As with the academics noted above, we will determine whether clinical supervisors have either of these two styles.

The instrument chosen for clinical teaching style is the Teaching and Learning Styles Self Assessment Tool (Langlois and Thach, 2001). This a 20 item self assessment tool that measures student or teacher centred teaching style on four domains. These are knowledge, attitudes, clinical skills and personality preferences. This instrument will administered to all clinicians who supervise chiropractic students in their fifth year at University approved clinics at all three Universities.

(iii) Teacher Feedback on Perceived Teaching Styles

We will also undertake a qualitative component in this study which will involve semi-structured interviews modified from Smith (2006). This will enhance richness of the information gleaned from the quantitative data.

A convenience sample of academic teachers and clinicians involved in the project will be interviewed by a researcher. The interviews will commence with a discussion of the results of their respective teaching style determined by the instruments. Then the discussions will be framed around the issues of:

- participant conceptualisation of learning styles and preferences;
- how stable and how contextualised participants see style;
- how much participants identified between-student variability in styles, and how
- much they saw commonalities within learner groups;
- how useful an understanding of individual learner and group styles is in teaching;
- how teachers made in-class style identifications about the styles and preferences of
- individuals or groups.
- how did they alter their teaching styles to address differences in learning style
- what teaching styles do they use in the classroom

The results of these studies will allow us to examine the teaching styles students were exposed to as they progress from academic to clinical components of their program.

Timeline for the administration of the instruments of measurement in a 1 year data collection period.

Academic year completed	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	Exit
Murdoch	L	G	LGT	GQ	LGT	G	LGTQ	G	LGT	G	LGT	GCQ	G
Macquarie							LGTQ	G	LGT	G	LGT	GCQ	G
RMIT							LGTQ	G	LGT	G	LGT	GCQ	G

Legend: L = Inventory of learning styles, G = Grades recorded, T = Teaching style PALS administered, C = Clinical teaching style surveyed, Q = Qualitative interviews with teachers on their teaching style

CONCLUSION

This project will investigate several crucial gaps in the present education literature regarding the transition from academic to clinical learning in health care education as experienced by chiropractic students in Australia. Our experience shows us that a significant proportion of students struggle with this transition period. This study will investigate these gaps utilizing three related and interconnected themes. The first theme explores learning style preferences; the second identifies teaching styles and the third bridges these two domains to identify their implications for pedagogy.

This study will give chiropractic educators a better understanding of how clinical students learn but also inspire novel teaching approaches and curriculum designs that can be applied by other clinical educators, and educational institutions.

EVALUATION STRATEGY

New projects, such as this one, are usually best evaluated using a process-outcomes approach. In these cases, the study commences with a focus on formative questions about how well the program is being implemented and what improvements need to be made. The focus then changes to summative questions about the extent to which the intended and unintended outcomes are being achieved.

Accordingly, ongoing formative evaluation will be used throughout the project, evaluating the processes used in the project, and monitoring progress against the project plan. A summative evaluation will be carried out during the final stages to establish the effectiveness of the project and how well the outcomes were achieved.

To minimise costs involved in a multi-intervention evaluation strategy, an evaluation consultant will be sought from the Perth region. After discussions with the evaluation consultant, the project team will conduct much of the monitoring and data collection work in line with an agreed plan. The participants in the project will also contribute to the evaluation, as part of their learning and action research, in a reflexive learning model. Broadening the scope of the evaluation to allow other staff to become involved in the learning and review cycle will promote acceptance, engagement and participation. This is a useful strategy for gaining involvement and educating staff that are potential targets for the program as it is expanded into the schools.

DISSEMINATION

Dissemination will occur within Murdoch, Macquarie and RMIT Universities through a cascading effect as Project leaders and the Deans pass on their results to the Unit co-coordinators. The intent is to use a multilevel approach where information is disseminated within each School to each Unit co-coordinator individually and also via each School's Curriculum committee. This will be supported by the external dissemination of outcomes through the CCIA, CCEA, conference papers, interim publications and seminars. Specifically;

- The cascading approach will also prevent the loss of expertise if a project leader leaves the University.
- The results will be published in a full report.
- Published papers and Conference proceedings will take the knowledge creation from the bottom up as chiropractic teachers assimilate the results. This will result in teaching and learning changes.
- The results of this project will be presented and discussed at each University in a forum for all staff who teach in the various chiropractic programs.
- The World Federation of Chiropractic (WFC) has acknowledged the importance of this project and has agreed to include the results in a series of newsletters to chiropractors globally.
- The Chiropractors Association of Australia has acknowledged the importance of this study and has agreed to disseminate the results to its members both nationally and internationally
- The Chiropractic and Osteopathic Association of Australia (COCA) has acknowledged the importance of this study and has agreed to disseminate the results to its members both nationally and internationally. Their newsletter is sent to all chiropractors registered in Australia and New Zealand.
- The Council on Chiropractic Education Australasia (CCEA); the educational accreditation body for Chiropractic in Australasia, has acknowledged the importance of this study and has agreed to disseminate the results of this project to its members in Australia and New Zealand.

Outside of Murdoch, Macquarie and RMIT Universities dissemination will also be through conference attendance and publications involving members of the project team, and through communication with the Key Policy and Practice Audiences in Institutions within Australia and overseas.

PROJECT REFERENCE GROUP

The following people/institutions have expressed their willingness to be members of the project reference group. Each of these people has experience with designing and administering initiatives with similarities to this project. The project reference group will ensure there is constructive advice on the design, development and ongoing evaluation of the project. They will also seek to ensure the project has maximum impact within Murdoch and beyond.

The project reference group will review and ratify the project plan via video-conference meetings as necessary.

Dr. Rick Ruegg BSc, PhD, DC	Clinic Director Canadian Memorial Chiropractic College Toronto, Canada
Dr. John Mrozek DC, MEd, FCCS(C)	Dean of Academic Affairs Texas Chiropractic College Houston, Texas, USA
Professor Simone Volet PhD	Professor of Educational Psychology Murdoch University
Mr. David Chapman-Smith	Executive Director, World Federation of Chiropractic, Toronto, Canada
Dr. Pauline Arnold PhD	Private Consultant, Organisational Psychology. Langeford, Western Australia

Project Activity Timeline

Date	Action
March 27/08	Submission to Carrick Foundation
June/08	Re-submit to Carrick Foundation
September/08	Carrick Education Grant Approval
September/08	Empanel Reference Group
October/08	Submit application for ethics approval at all institutions
November/08	Run pilot project to test instruments and protocols at Murdoch University
November/08	Appoint external evaluator
Early February/09	Run training sessions and pilot projects at collaborating institutions
February/09	Institute data collection at all institutions
March/09	Progress report to Carrick Foundation
February-Dec/09	Data collection period ends
December/09-March/10	Analysis of data
March/10-July/10	Dissemination activities

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