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## Learning styles in vertically integrated teaching

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### SUMMARY

**Background:** With vertical integration, registrars and medical students attend the same educational workshops. It is not known whether these learners have similar or different learning styles related to their level of education within the medical training schema. This study aims to collect information about learning styles with a view to changing teaching strategies. If a significant difference is demonstrated this will impact on required approaches to teaching.

**Methods:** The VARK learning inventory questionnaire was administered to 36 general practice registrars and 20 medical students. The learning styles were compared as individuals and then related to their level of education within the medical training schema.

**Results:** Students had a greater preference for multimodal learning compared with registrars (62.5 per cent versus 33.3 per cent, respectively). More than half of the registrars preferred uni or bimodal learning modalities, compared with one-third of the medical students.

**Discussion:** The present work-shop format based on visual and aural material will not match the learning needs of most learners. This small study has shown that the majority of medical students and registrars could have their learning preferences better met by the addition of written material to the workshop series. Surprisingly, a significantly larger number of medical students than registrars appeared to be broadly multi-modal in their learning style, and this warrants further research.

### INTRODUCTION

Australian general practice is increasingly adopting vertical integration of training across medical students, junior doctors, overseas trained doctors and general practice (GP) registrars.<sup>1</sup> In keeping with this national trend, Queensland Rural Medical Education (QRME), a regional training provider funded by Commonwealth General Practice Education and Training, has begun integrating lecture programmes and workshops. The programme had previously been designed specifically for GP registrars, but recently expanded to involve third- and fourth (final)- year medical students from the Rural Stream of Griffith University School of Medicine. These rural medical students (RM students) are in longitudinal vertically integrated clinical placements with rural GP registrars. The focus of this paper is on learning styles related to integration in lectures and workshops.

The purpose of integration may cynically be assumed to be economy of scale. Didactic teaching is efficient: a greater number of learners stand to benefit from a well-organised and expert lecture series. However, the workshop component of the programme is where more substantial educational benefits may be realised. Opportunities arise for the learning needs of each group to be

addressed by other learners within the integrated stream, using teaching opportunities to enhance learning.

The introduction of vertical integration to our workshops provided an opportunity for us to investigate the preferred learning styles of our diverse learner population, and to see if these varied based on their experience and level of training.

A learning style (or preference) can be defined as 'the complex manner in which learners most efficiently and effectively perceive, process, store and recall what they are attempting to learn'.<sup>2</sup> A mismatch between preferred learning styles and approaches to teaching can potentially adversely impact a vertically integrated education system, as untrained teachers will preferentially teach in a similar manner as they prefer to learn, or use pedagogies that favour one or more specific learning styles.<sup>3</sup>

Despite their popularity there is little empirical research on how learning styles affect academic performance. A non-peer-reviewed literature review by Corfield et al. studied 13 (out of 71) of the most influential learning style modes.<sup>4</sup> They concluded that the idea of a learning cycle, the consistency of visual, auditory and kinaesthetic preferences, and the value of matching teaching and learning styles were all 'highly questionable'. In contrast, a meta-analysis by Lovelace showed that matching students' learning-style preferences with complementary instruction improved academic achievement and student attitudes toward learning.<sup>5</sup>

For our introductory study, the multichoice VARK questionnaire was selected.<sup>6</sup> VARK defines learning styles in terms of four major sensory modalities: visual (V), auditory (A), read and write (R/W), and kinaesthetic (K). Multimodal learners are represented by the relevant combination of letters. Although the VARK questionnaire has not been statistically validated,<sup>7</sup> it was chosen as it is easy to administer and our GP teachers are introduced to it through two university developed teaching programmes: Teaching on the Run and Symbiotic Clinical Education for Health Professionals.<sup>8,9</sup> We considered it a benefit to have common understanding of terminology when designing future changes to our teaching programme.

Two studies of medical student learning styles using the VARK inventories demonstrated that the majority of students had a balanced set of preferences across the four modalities measured.<sup>10,11</sup> English GP registrars, studied using a different inventory, demonstrated a wide range of learning styles.<sup>12</sup> No studies using the VARK inventory with GP registrars could be found. This study investigates Australian Rural GP registrars and RM students using the VARK inventory.

## **METHODS**

Ethics approval was granted from Flinders University and Griffith University Social and Behavioural Research committees.

Given that both medical students and GP registrars are experienced learners, we established our

vertically integrated model presuming that both groups would be multimodal learners: capable across a breadth of learning styles. The current programme favours learners with aural, visual and kinaesthetic preferences (in descending order of preference). Thirty-six GP registrars commencing their second 6 months in general practice and 20 third- and fourth-year RM students were invited to participate in the study. This target group were the expected attendees at a regular QRME workshop.

Potential participants were contacted via e-mail and provided with the information and consent page, and a web address from which to access the online VARK style and strategies for learning, accommodating their learning style.

The proportion of participants with each particular learning preference is described, with differences between registrars and students compared using Yates' modification of the chi-squared test.

## RESULTS

The overall response rate to the questionnaire was 87.5 per cent (49 / 56). Three responses (5.3%) were excluded because they did not identify themselves as being an RM student or a GP registrar. Analysis was based on 46 completed questionnaires, 16 of 20 RM students (80%) and 30 of 36 GP registrars (83.3%).

According to the sensory modality preferences determined by the VARK questionnaire, 12.5 per cent of students and 33 per cent of registrars preferred a single sensory modality. Significantly more students than registrars (62.5 and 33.3%, respectively,  $p = 0.03$ ) indicated a balanced choice across all four modes (Table 1).

Table 1. VARK preferences: percentage of each group expressing a preference for one or more modality

Learner	Unimodal	Bimodal	Trimodal	Quadmodal
Students	12.5	25	0	62.5
Registrars	33.3	26.7	6.7	33.3

Combining single or multiple VARK preferences yields fifteen ( $2^4 - 1$ ) possible combinations, of which only 10 were represented within our study population. These are compared as percent-ages of the RM student and GP registrar groups in Figure 1.

Respondents were evenly distributed in sensory preference. Notably, a small proportion was identified as being exclusively kinaesthetic learners (not V, A or R; Table 2).

## DISCUSSION

Our assumption at the beginning of the study had been that most adult learners become reasonably adept and adaptable by the time they achieve university or post-graduate level. With the VARK questionnaire, adaptability manifests as multimodal preference, with the most adaptable learners being quadmodal. Any lecture-based programme will tend to favour visual and auditory learners. Our data suggest that a lecture programme fails to meet the sensory preferences of 19 per cent of RM students and 30 per cent of GP registrars. This has implications for programme planning and delivery.

Although there are limitations to our study (i.e. the small number of participants, self-reported questionnaire and survey not validated), it is interesting to compare our findings with previously published studies of American and Turkish medical students,<sup>10,11</sup> and students surveyed by VARK via the internet.<sup>6</sup> Registrars in our study appear to be relatively similar to these surveyed populations (Table 3).

It is interesting to note that a higher proportion of RM students in our study were multimodal in their learning. This was an unexpected finding. There are a number of plausible hypotheses to explain this apparent flexibility in medical students. A recent increased focus on adult learning and multimodal teaching in university may have exposed students to a greater variety of teaching styles, contributing to the observed differences here. Alternatively, learners may mature towards establishing fixed learning preferences. The overall preference for kinaesthetic learning experiences by RM students supports the use of simulation training.

It could be argued that learning styles do not directly impact on learning.<sup>13</sup> Nevertheless, an understanding of different learning styles can lead to an improved matching of teaching approaches with learning styles and fulfils adult learning principals. At the very least, VARK gives us an extended and shared language to discuss the learning needs of students and the teaching modalities that we can use to meet those needs.

Our findings describe the nature of preferred learning modalities for Australian GP registrars and RM students. The nature of these preferences will inform the design of our lectures and workshops. With this knowledge of the difference between registrar and student learning, preferences will necessarily be accommodated within the vertically integrated programme. Our first intervention is to add a workbook that includes key readings, a copy of presentations, questions to encourage reflection on material and key clinical activity, to undertake where appropriate. The combination of lectures, workshop and workbook will in theory cover all four modalities and provide for the larger group of learners with a read / write preference.

More study is required to establish the extent to which a mismatch between learning styles and teaching pedagogies result in poorer learning outcomes. This will be difficult to determine convincingly, because it is widely recognised that good learners generally compensate for poor

teaching.<sup>14</sup> Although it has not yet been established that being a multimodal learner genuinely makes one a 'good' learner, this is a tenable argument and a topic for further study.

Figure 1

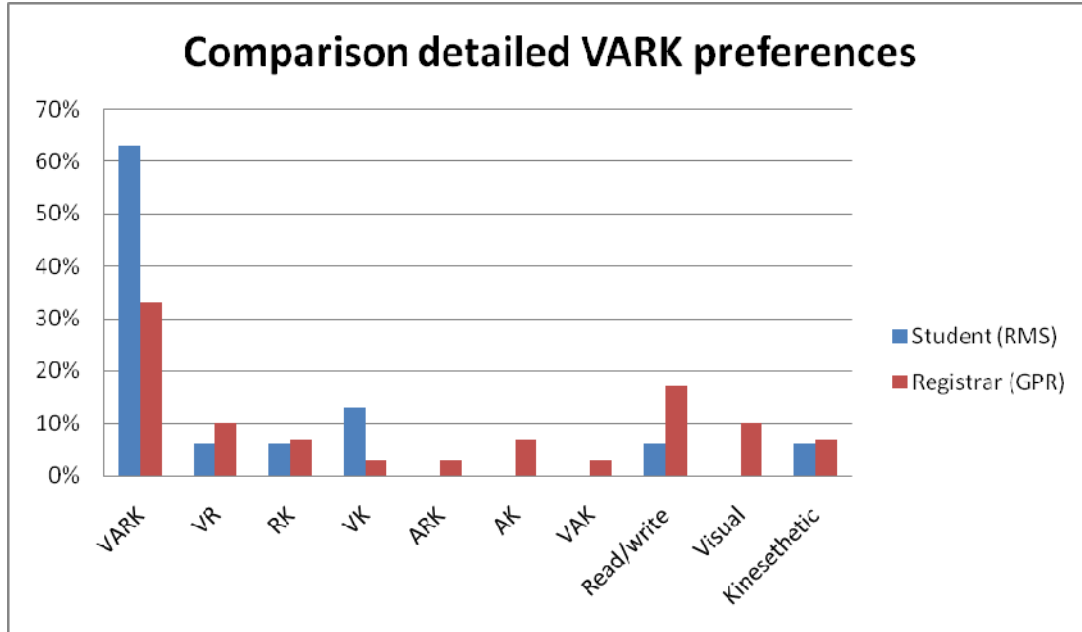


Table 2: Proportion of respondents by sensory preference

%	Visual	Auditory	Read/Write	Kinaesthetic	Not V/A	Not V/A/R
Student	81.3	62.5	81.3	87.5	18.38	6.3
Registrar	60.0	53.3	70.0	63.3	30.0	6.7

Table 3: Comparison of our two groups against other studies:

Learner	Unimodal %	Bimodal %	Trimodal %	Quadmodal %
Student	12.5	25	0	62.5
Registrar	33.3	26.7	6.7	33.3
American 1 <sup>st</sup> year medical students <sup>10</sup>	36.1	24.5	32.1	43.4

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