SUPPORT DOCUMENTS

Accommodating learning styles: Relevance and good practice in vocational education and training – Support documents

DEAKIN UNIVERSITY

This document was produced by the author(s) based on their research for the report, *Accommodating learning styles: Relevance and good practice in vocational education and training*, and is an added resource for further information. The report is available on NCVER's website: <http://www.ncver.edu.au>

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PART 1: RESEARCH METHODOLOGY AND FINDINGS

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Research questions

The more general purposes we had for this research could be cast into a set of quite specific questions:

✧ To what extent does the VET sector take account of the preferred learning styles of different groups of learners?

✧ Where account is not taken, what information do VET instructors use to develop instructional methods? Where account is taken, what is commonly understood, and what teaching practices have resulted?

✧ How useful is knowledge of a selection of styles and preferences theories to VET instructors and planners, and to VET learners? How much use can be made of them, and in what form?

✧ What are some of the exemplars of good practice in the use of a knowledge of learning styles/preferences in VET teaching, and how might these exemplars be disseminated and embraced by other VET practitioners? How do these exemplars handle assessment issues as part of consideration for learning style?

✧ What strategies can be employed by VET instructors to develop self-management of learning among their clients; and what are the strategies that can be used by learners?

✧ Can development of those strategies enhance learner motivation and capacity to develop lifelong learning mind-sets?

✧ What professional development is likely to assist VET instructors to use learning styles to develop more client-focused teaching processes; and to develop self-managed learning in those clients?

Research methodology

Research sites

The research was conducted in five institutes of TAFE and one network of private and public RTO trainers and assessors. These six sites were located across Victoria, South Australia and Western Australia. Subsequent to a research ethics application being approved by Deakin University, managements at the five TAFE institutes were contacted to request permission to conduct the research in each of the institutes. That permission was obtained in every case, and individual participants then contacted to secure their involvement. With the training network individuals were approached in the first instance since there is no formal organization of that network.

Research sites were located in metropolitan and regional locations.

At each site a staff member was identified as interested in the research and served as a facilitator in each site. Those facilitators, together with the Deakin University research team, formed the Project Reference Group which met mainly by teleconference.

Data collection methods and participants

The research methodology comprised five major data collection methods:

✧ A questionnaire designed to inform the research on how teachers in VET identify different features of learning styles among their students, how confident they feel in their identifications, and whether they use those identifications in designing and delivering training and assessment. The questionnaire was administered to 160 teachers across the six research sites, with 79 males and 81 female respondents. Eleven respondents answered the questionnaire with Certificate I or II students in minds; 59 with Certificate III or IV students in mind; and 89 with Diploma or Advanced Diploma. For one respondent the AQF level was not clear.

✧ Three focus groups were conducted among teachers at each of the sites. One of these focus groups at each site was levelled at people teaching Certificate I and II students; one with teachers of Certificate III and IV students; and one of teachers of Diploma or Advanced Diploma. A total of 17 focus groups were conducted among teachers, involving a total of 88 teachers, fairly equally distributed across the three categories of AQF level used in the research. One focus group was not able to be conducted.

✧ Three focus groups were conducted among students at each of the sites. One of these focus groups at each site was levelled at students in Certificates I or II; one with students of Certificates III and IV; and one of students of Diploma or Advanced Diploma. A total of 14 focus groups were conducted among students, involving a total of 91 participants, again fairly equally distributed across the three AQF level categories used in the research.. Four planned focus groups could not be conducted due to insufficient numbers available at that level in the institute at the time.

✧ Thirteen case studies of teachers/trainers who expressed particular interest in using learning styles in their teaching, and who were identified as employing some exemplary practices.

✧ A focus group of managers, human resource specialists, and teachers was conducted at each site to comment on and form some validation of the professional development program suggested from the research.

All data collection occurred between October 2003 and February 2004.

The research findings have limitations insofar as the participants in the research were self-selected in the questionnaire and focus group components. Accordingly, they are likely to over-represent VET practitioners who have an interest in the learning styles and preferences of their students. There was some overlap between participants in the questionnaire and focus group components. Case study participants were identified as teachers interested in learning styles and were approached for participation on a targeted basis. There was some minor overlap between case study participants and focus group participants.

Data collection tools and analyses of data

Questionnaire

The questionnaire was designed by the research team and discussed and adjusted through the Project reference Group. It was then piloted on a small number of people to assess intelligibility and answerability. Following the collection of the data, the questionnaire was subjected to a reliability analysis to gauge its effectiveness as a research tool. The reliability analysis yielded a Cronbach Alpha of 0.94. For no item was the Alpha if Item deleted score higher than the Cronbach, indicating that all items performed satisfactorily in the questionnaire.

Questionnaire data were analysed through the SPSS statistical package.

Focus group themes

Focus group themes were developed by the research team for teachers/trainers and for students, following the intent of the research questions. These themes were then discussed by the Project Reference Group and adjusted as necessary. Focus groups were tape recorded with the permission of the participants, and focus group facilitators kept notes during the sessions. These data were content analysed to extract meaning from across the groups.

The procedure for student focus groups was identical to that used for teachers/trainers.

Case study themes

Case study themes were also developed by the research team and discussed with the Project Reference Group, and adjusted through discussion. These themes were underpinned by some smaller subthemes as guides to the case study interview. Generally case studies were not taped, but notes kept by the interviewer, with the case study written up after the interview. The case study was provided to each participant for accuracy checking.

Professional development focus groups

The identified professional development ideas were generated into a short paper with a set of themes for the group meeting identified. Again these were provided to the project reference Group for discussion and adjustment. Data were analysed from notes kept during the group meetings.

All data collection instruments can be viewed in the Appendices of the major research report.

Findings

The findings from the research are organised here under headings that reflect the seven research questions.

The extent to which VET teachers take account of styles

The data informing this Research Question were derived from the questionnaires, and from the teacher and student Focus Groups. The self-selected nature of the research participants is likely to have resulted in a set of research participants more aware of styles than is the case generally among teachers across VET. That limitation in the research needs to be borne in mind when interpreting the results from this component of the research.

In general, there is considerable evidence that VET teachers pay attention to the learning styles of groups and of individuals, and most make a habit of assessing those styles through their observations of students as they learn, and as they interact in class sessions. A number of the questions on the questionnaire were focussed on gathering that information and an exploratory factor analysis indicated that these items did indeed hold together as a single scale. Mean scores for each of those questions were high. Table 1 shows the relevant questions, the mean scores and the standard deviations. Recall in interpreting Table 1 that the scale ran from 1, being 'hardly ever', through to 5, being 'nearly always'. Note also that question 20 doesn't appear in the Table since it was measuring a different characteristic.

Table 1: Questionnaire items: Means and standard deviations

Question	Mean	Std Devn
13. *My students learn best when* I design my teaching materials to suit their learning styles	4.28	0.87
14. *My students learn best when* I design my teaching delivery to suit their learning styles	4.33	0.78
15. *It matters to my students* whether or not I try to cater to their learning styles	4.19	0.90
16. *I believe in developing my teaching* to suit the learning styles I find most typical of my students	4.28	0.88
17. *I spend time trying to identify* the learning styles of my students	3.87	1.15
18. *I develop my teaching* to suit my students' typical learning styles	3.98	0.96
19. *I can identify* some typical learning styles among my students	3.98	0.87
21. *When I design assessment* for my groups of students, I take their typical learning styles into account	3.64	1.09
22. *I take learning styles into account* when I design individualised assessment for my students	3.86	1.18

The questionnaire data indicates a strong belief among teachers that learning styles matter and need to be taken into account when designing and delivering instruction to students. There is a slightly lower set of scores related to spending time identifying styles and actually developing teaching to suit. The focus group data indicates that the lower scores here are not due to lower commitment among teachers to undertake these tasks. However, there are some time and other constraints that make it more difficult to do these things as specific and separate exercises, but teachers believe that they largely achieve the tasks of identifying style and developing teaching to suit through their everyday teaching. In other words, these things are done in the course of their teaching and are not treated as separate and special features of their teaching deliberations. As one teacher participant in a focus group put it:

> I use an instinctive identification of how individuals like to learn – based on experience rather than on a theoretical model.

It is also noteworthy that the scores for those questions relating to assessment design are lower than other scores on this set of questions. Again, the focus group data indicates that there are perceived and real constraints on teachers in designing style-based assessments, although this was strongly recognised as desirable. The higher standard deviations for the assessment related questions (21 & 22) indicates that there is a comparatively greater variability among teachers in how much they take styles into account in designing assessment. There was indication in the focus group data that this variability related to real and perceived differences between training package assessment guidelines, such that there was a perception that some allowed for style based design more than others. At the same time, although the assessment question scores were generally lower than scores on other questions shown in Table 1, they still represent an average capacity to design assessment to suit style somewhere between 'reasonably often' and 'quite often'.

Teachers in focus groups were largely of the view that knowledge of learning styles is an important component of effective teaching design and delivery, but that knowledge forms only a part of the array of understandings required. One teacher put this succinctly, in a way that represented a common view, when she said:

> Learning styles can be another tool we use to impart knowledge, with a proviso that you shouldn't be over reliant on them.

There was also a widespread understanding that styles vary between groups of students and that these typical styles could be effectively used to deliver instruction in ways that students found most meaningful, and that could increase student motivation to learn. Comments were made by teachers that indicated that learning through relevant tasks is most interesting to students, and can be an empowering experience for them. The evidence was that the majority of teachers in the focus groups did cater to style at least at the group level, tempered with a view, as expressed by one participant:

> Identifying styles can be helpful if you use it to suggest ways for individual learners to consolidate their learning – but you have to be careful not to use it to label people or to put them in boxes.

The distinction between catering for individual style and group style was made on several occasions, with the point being made that teachers generally have insufficient time to cater to individual styles and have to work at group levels instead. Also related to the issue of the level at which learning styles information is taken into account, the focus group evidence was largely that styles were not taken into account at a level of great detail, but at a higher level of analysis that largely included visual, auditory and kinaesthetic understandings of styles, together with an understanding of student preference towards self-paced and/or self-direction. Considerable comment was made about VET student preference for hands-on learning, converging with other comment about the kinaesthetic learning modality.

Discussions about training packages in the focus groups of teachers drew a wide variety of responses. These responses varied from a positive statement that:

> A training package says what you're going to do, not how you are going to do it. There is huge scope to use learning styles as a strategy in delivering training packages, especially with adults.

That comment made in one of the focus groups drew considerable discussion and disagreement with some participants believing that training packages did not readily allow for the use of style based teaching approaches. However, the majority of that disagreement, which was evident in other focus groups of teachers, was related to the distinction between the

endorsed components of training packages and the support resources. There was considerable agreement that where the pre-packaged learning resources were being used within training package delivery. Two specific comments are worth relating here:

> Packaged learning resources available to support training packages can reduce capacity to respond to differences in style

and

> The packaging of support resources has made some teachers lazy to cater for individuals.

A similar range of views was evident in discussions about assessment, with some teachers making observations typified by the following comment:

> Training packages being competency based allow more flexibility in assessment, and this allows you to adjust both delivery and assessment strategies.

Views that training packages made style based assessment more difficult were varied in nature, with some teachers suggesting that because the competencies to be achieved were limited in their scope the assessment varieties available were also limited. Other views were that the required assessment in training packages gave students little scope to show skills that were related to their style, such as dispositional learning associated with deployment of a competency outcome in the workplace. A further view voiced by a few teachers was that training packages are being delivered by competitor RTOs in very short periods of time such that variations in delivery and assessment to cater for style were severely limited since they tended to lengthen training time and render their institution less competitive in the marketplace.

Student focus groups also indicated that learning styles are important to them. In general students were positive about the way their instructors catered for the way they liked to learn, with most comment relating to their preference to learn by doing, and observing that VET instructors mainly provided for that form of learning. The students also remarked that VET teachers usually provided an opportunity to put learning into practice very soon after a theory component had been taught, or that theory and practice were integrated together in the delivery. It was common among student focus groups to hear that their teachers engaged with them as individuals:

> TAFE teachers treat students as people, not subjects.

Finally, evidence on the extent to which the VET sector takes account of preferred learning styles can be adduced from the commitment across the sector to professional development that is related to learning styles. In all six institutions that formed the sites for the current research there had been a sequence of professional development programs related to styles, preferences or strategies. These PD programs had taken several different forms, including workshops and forums, and focussing sometimes on a particular theory or instrument, and at other times on more general conceptual understanding of styles. Amongst the questionnaire respondents 58.8% had engaged in PD related to learning styles and, of those, 89.4% reported that the PD had been built around a recognised theory of styles, or a set of recognised theories. MANOVAs calculated on the data from each of the questions in the questionnaire indicate that those teachers who had participated in a professional development program on learning styles were significantly higher in their perception that students learn best when their styles are taken into account (Qn.14, $p<0.05$), and that catering to learning styles matters to their students (Qn 15, $p<0.05$). Additionally, teachers who had participated in a PD program felt that they spent more time identifying student styles (Qn.17, $p<0.05$); and believed they had a stronger understanding of styles (Qn 20, $p<0.01$).

Brief summary

Awareness of students' learning styles or preferences is common among those who participated in this research, and they have an appreciation that students learn in different ways. Much of what they subsequently do in responding to different learning styles and preferences is intrinsic rather than being a deliberate and conscious planning process. Nevertheless some of the more aware VET practitioners, represented by many of those who were interviewed for the case studies, have taken their understanding about how students' learn, into a higher level of conscious awareness and incorporate that understanding into their teaching and to a lesser extent their assessment practices.

Common understandings of styles and resulting teaching practices

Few respondents to either the questionnaire or within the teacher focus groups said they took no account of style. However, there were remarks made as discussed above that this was sometimes constrained by their own time or by the time they had with their students; and sometimes constrained by the use of pre-packaged learning materials, particularly those in self-paced format. A further constraint noted by several focus group participants is that the industries and employers with whom they work have quite definite ideas about how instruction should be carried out, and are critical when that method is not followed. Most usually those industry and employer-preferred methods are traditional ones, where the instructor is required to treat the class as a fairly homogeneous group of learners, and deliver in a training room at specified times. One other participant remarked that institutional teaching policies also constrained account being taken of learning styles insofar as he was expected to teach within a limited set of paradigms.

In summary, where account is not taken of learning styles the evidence available indicates that design and delivery are based on experiences that teachers have had, and on the requirements of the context for learning. Those contexts include industry requirements, institutional teaching policies, and self-paced instruction.

What was far more evident in the questionnaire responses and the teacher focus groups was that significant account of student learning styles appears to be taken in the design and delivery of instruction, and that account being taken is commonly characteristic of teacher behaviour.

What was understood to be 'style'

Understanding about different levels of styles was considerable among teachers participating in focus groups. Few distinguished between styles and preferences in any formal way and tended to use these terms interchangeably, with the understanding that they described the way that an individual likes to go about learning. There was some distinguishing between learning strategies and styles, with an understanding that strategies represented the activities and processes students used to learn. Although style was commonly conceptualised as the way an individual likes to go about learning, there was a range of expressions of that common understanding, representing different insights into style theory and different PD experiences with it. Some participants saw style differences between individuals as representing the different ways people decode information to make meaning from it, being a rather cognitive view; while others saw it as a different mix of preferences associated with sensory modalities such as visual, auditory and kinaesthetic. Although a large number of participant teachers in focus groups spoke of particular theories and models of styles that they were familiar with, the majority of people, including those who were abreast of theoretical models, identified the styles of students that they taught at a fairly macro-level. That macro-level was characterised by

identifying student styles in terms of the sensory modalities mentioned above, together with student preferences for self-paced learning, self-direction and independent learning, reading, hands-on experience, learning with structure and guidance, and learning through social interaction with others. What was evident here that teachers analysed student styles at a level they could observe in the classroom, and that they could actually use in their teaching design and delivery. That very pragmatic approach was evident among most teachers in the focus groups and meant that they could work with styles at a useable level of analysis. It is noteworthy here that question 20 in the questionnaire that asked teachers to rate their understanding of learning styles showed a mean of 3.95, indicating that teachers self-assessed their own knowledge as being 'good'. The relatively narrow standard deviation of 0.83 indicates that the level of understanding was perceived to be fairly similar across the respondents.

The questionnaire we used in this study also took that macro-level approach of those style characteristics that a teacher has opportunity of observing while interacting with students. Table 2 shows the means and standard deviations for the questions relating to style identification.

Table 2: Remaining questionnaire items: Means and standard deviations

Question	Mean	Std Devn
1. I can identify which of my students like to learn from visual sources such as videos and pictures	3.51	1.02
2. I can identify which of my students like to learn from me giving them lectures in class	3.71	0.94
3. I can identify which of my students like to learn from demonstrations of skills that I provide or organise someone else to provide	4.01	0.91
4. I can identify which of my students like to learn from doing the actual hands on task they are learning about	4.21	0.88
5. I can identify which of my students like to learn from reading learning materials that I prepare	3.60	0.91
6. I can identify which of my students like to learn from reading learning materials supplied by publishers	3.26	1.04
7. I can identify which of my students like to learn through discussion with me	4.13	0.77
8. I can identify which of my students like to learn through discussion with each other	3.81	0.96
9. I can identify which of my students like to learn by themselves	3.53	1.04
10. I can identify which of my students like to learn in a group setting	3.76	0.93
11. I can identify which of my students like to learn with me giving them close guidance	4.10	0.91
12. I can identify which of my students are good at being self-directed learners	3.86	0.99

These results from the questionnaire need to be interpreted in a context that the means of all questions indicate teachers rate their capacity to identify, on average, all characteristics of student style covered in the questionnaire at least at the 'reasonably often' level, and ranging to just above 'good'. That overall result indicates a fair degree of confidence in teachers about being able to make those identifications. Closer inspection of the distribution of means is also interesting. Questions 6 and 9 perform at a lower level than the other questions. Both those questions relate to a style identification that would be quite difficult for a teacher to assess through interaction with a student. On the other hand, questions 4 and 11 call for the identification of style characteristics that would be much more available to a teacher to observe. These data suggest that teachers identifications of student style are made through observation of the student as he or she goes about their learning in the teacher's presence. While that finding is one largely to be expected, it does indicate that teachers are typically evidence-based in making their assessments, that they do make these assessments as class proceeds, as

discussed under Research Question 1. Additionally, the finding converges with the evidence from focus groups that self-paced learning reduces teacher opportunity to identify and respond to style differences.

We also conducted an exploratory factor analysis on the questionnaire data for just the first twelve questions, all of which relate to style identification. The factor analysis technique provides an understanding of what clusters of style identifying characteristics teachers see as being related to each other. A coherent pattern to the analysis indicates that teachers hold a collectively coherent set of understandings about style. Our analysis indicated two major factors. The first of these included questions 1 to 7. That factor is associated with identifying style through activities that represent methods of content presentation used by the teacher. Factor 2 included questions 8 to12, and is associated with the contexts of learning – in social groups or by themselves, with self-direction or with teacher guidance. What is particularly important about this finding in the current study is that there is clear indication that teachers have a very coherent set of understandings of style, and they see two major components. The first of these components relates to teachers being able to identify style through the delivery techniques that a teacher might use in a class setting; and the other component relates to the identification of style as degree of preference for independent or dependent learning.

Table 3: Results of the exploratory factor analysis

Question	Factor 1	Factor 2
Eigenvalue/percentage of variance	3.81/31.78	3.31/27.76
1. I can identify which of my students like to learn from visual sources such as videos and pictures	.68	
2. I can identify which of my students like to learn from me giving them lectures in class	.71	
3. I can identify which of my students like to learn from demonstrations of skills that I provide or organise someone else to provide	.83	
4. I can identify which of my students like to learn from doing the actual hands on task they are learning about	.77	
5. I can identify which of my students like to learn from reading learning materials that I prepare	.65	
6. I can identify which of my students like to learn from reading learning materials supplied by publishers	.51	
7. I can identify which of my students like to learn through discussion with me	.58	
8. I can identify which of my students like to learn through discussion with each other		.61
9. I can identify which of my students like to learn by themselves		.79
10. I can identify which of my students like to learn in a group setting		.63
11. I can identify which of my students like to learn with me giving them close guidance		.69
12. I can identify which of my students are good at being self-directed learners		.81

The findings of two components attending the identification of style by teachers was also borne out in the case study component of the research, where several participants had made a similar observation. In practice the first of these two components is operationalised by teachers making direct observations of group and individual reaction to presentation methods used and, from time to time, the trialling by teachers of presentation methods in order to better inform their naturalistic observations and conclusions. The second component, associated with social or more independent contexts for learning, is operationalised by teacher observation of student behaviour. With respect to preferences for social contexts for learning this was more often than not directly observed within classroom settings. Preferences for more independent learning were largely inductive conclusions by teachers where students expressed a wish for self-paced or independent learning materials that they would engage with outside the

classroom setting. For example, one case study participant made particular mention of catering to students who preferred to learn through resources that were made available to take away from the classroom, or that were available within a learning resource centre. To some degree these conclusions were sometimes based on what the teacher was not able to directly observe about the student within the classroom, but instead what they understood to be occurring outside the classroom and away from direct teacher observation.

We also calculated factor scores for each individual teacher for each of the two factors identified and compared these on a basis of participation in a PD program or no such participation, and on a basis of gender. While there were no differences between the participation/non-participation groups on either factor, females did show a higher score than males on factor 2 ($p<0.01$), indicating a higher confidence among female teachers that they are able to identify learning style features of students that are not directly observable in the classroom.

Resultant teaching practices

The teacher and student focus groups provided a considerable insight into a wide range of teaching practices that result from teacher identification of styles.

In terms of response to style the evidence indicates that teachers identify styles at individual student level and use that as part of their development of a picture of group style and, at the same time they develop that picture of group style from collective characteristics they observe about the group. In the main, teachers design and deliver to cater for group styles, but they respond to individual styles when working with individual students. That distinction is operationalised by teachers developing a range of delivery techniques and media uses that they believe will be well accepted by the group of learners and that forms their 'public delivery' teaching pattern for that group. Within that group context, though, individual students will show signs of difficulty with certain parts of the work, or they will ask questions, or seek discussion with the teacher. At that level the teacher response becomes much more individualised and, at least in part, is framed around the teacher's knowledge of how that individual student learns. Although there was comment that self-paced learning reduces the purchase that teachers have on responding to individual style, there was evidence that this it is through this individual level of response that teachers do achieve some capacity to respond to individual student style.

The most commonly adopted way of catering to style was to ensure that teaching delivery included a range of media and techniques of exposition within the parameters of perceived group style and available resources. In that way, the view was expressed commonly, students would likely be exposed to a number of preferred techniques and some that were not so preferred. As one respondent put it:

> Plan every part of a course to have something for all styles – use a variety of teaching styles and techniques.

There is evidence in that statement of the 'non-adaptive' (Sadler-Smith, 1996) being used by ensuring a range of delivery techniques are used such that learners can make some choice between them. While that is more difficult to achieve in a classroom it was commonly observed by teachers who had moved towards more flexible forms of delivery, where choices could be made between parallel forms of delivery. Within classroom setting there was some evidence of parallel forms of delivery, but more commonly variety was provided in a serial way. Classroom teaching was seen by some as potentially being rather rigid and less able to adapt to individual styles, but it was commonly observed that it is wise to:

Plan sessions to be flexible and respond to needs as they arise in the group.

A second method that was observed in some focus groups of teachers is to provide a variety of teachers such that teaching styles were quite naturally varied. This was sometimes in a context of team teaching in some trade areas, but most commonly operationalised by serial teacher changes.

Group activities were seen by many focus group respondents as being an effective way to cater to style differences, since students could join different groups as that group suited their style and, of course, their social relationships within the class. Group work also provided a form of student-centred learning since groups could develop their own ways of going about learning such that any individual style may be catered for better by the smaller group, rather than being swamped by the whole class. Some teachers also observed that group work is not for every learner and the comment was made;

> Where group activities don't work for some individuals, those individuals are provided with alternatives.

Designing teaching to ensure a considerable degree of practical work was a very common way that teachers used to cater to a perceived VET learner style of preference for hands-on. At the same time there was a good deal of comment that theory sessions need to be controlled to a minimum and be interspersed with practice. Students also made the same observations when they said such things as:

> It's hard to sit in a theory class all day

and

> Having some theory then some practice straight after it is the best way I learn.

Indeed, among student focus groups at all AQF levels the comments about the need for hands-on to be maximised and theory sessions to be minimised was the most commonly made observation about how teachers could best cater for student learning style.

A final set of teacher responses to style were concerned with assessment. Assessment variation was widely acknowledged by teachers as an important component of catering to style, but there was also a feeling that variety in assessment is hard to achieve. Some teachers commented that they had developed a number of assessment style variations, such that they were able to provide assessment of competencies where appropriate through oral or written tests, through practical or written tests, and through a variety of practical assessments. Some had also developed different questioning techniques for different students through observation that sometimes a student would find it hard to engage with an assessment task because of the way the task was worded. Varying the way in which the task requirements are provided to a student can enable them to show that they have the requisite knowledge to achieve the assessment outcome. The point being made here was that assessment difficulties among students were not always because there was insufficient knowledge or skill to meet the requirement, but that the way in which the assessment task is framed can be the barrier. In the same context there was comment from some teacher participants that the current state of development in online assessment does not provide sufficient scope for that sort of variation. At the same time there was also acknowledgement that further development of online assessment can be expected to alleviate this barrier at least to some extent.

There was also comment that some employers and industries have particular ideas (usually rather traditional ones) about how effective and useful assessment should be conducted to yield outcomes that they believe to be valuable.

Brief summary

While teachers might refer to the learning differences between students or between groups of students as styles, preferences or strategies most did not have a strong theoretical basis for their understanding. Nevertheless they were able to identify characteristics such as students' preferences for working alone or in groups, the extent of their dependence or independence as learners or whether they were learners who responded best to listening, watching or doing. Teaching practice incorporated flexibility and responsiveness to individual needs based on the teachers' observations coupled with intuition honed by experience. There was a tendency for teachers to underestimate students' levels of understanding of their own learning styles and preferences.

Utility of knowledge of styles to VET instructors and planners, and to VET learners

Referring briefly to the questionnaire data shown in Tables 1 and 2 above, there is considerable evidence that teachers perceive that they do take account of style in the design and delivery of their teaching. The questionnaire responses also indicate that, although style is taken into account in designing assessment, teachers perceive themselves to do less of this than in the design of teaching. As discussed above, this difference between teaching design and assessment design in how much styles are taken into account is largely related to a view that there is less scope for it in assessment.

The factor analysis described above (see Table 2) is also useful in addressing this third research question. Teachers identify two major dimensions in their identification of student styles. The first of these dimensions is related to what teachers observe in their direct interactions with their students, while the second dimensions relates largely to those learning behaviours which are directly observable by the teacher. The directly observable features of style included in that first dimension are those that are related to preferences of instructional presentation and instructional activity, indicating that a knowledge of preferences rather than style is what is most important to them and most useable in the classroom. The less directly observable features of style are those associated with student use of resources that are not necessarily present in the immediate teaching environment, and that are associated with self-initiated learning activities and self-direction of learning. That finding indicates that a knowledge of style is also important for teachers to understand and acknowledge the presence of non-observable learning behaviours.

Additionally, as discussed in the previous section, the statistical analysis of the questionnaire also indicated that participation in a professional development program had resulted in teachers feeling:

- More strongly that catering to style matters to their students;
- More confident in their ability to identify typical student learning styles;
- More confident in their own understanding of styles.

Responses of teachers to the questionnaire and within the focus groups indicate that a considerable amount of attention is given to the identification of style and preference, and to catering to those features of individuals and groups. Among teachers there was a frequent view that catering for style/preference is a valuable strategy – a view echoed by students in their focus groups. It was also clear that the identification of style by teachers comes from a knowledge that individuals do vary in style/preference, that there are models of style/preference that can be usefully applied, but that the application of these is very practical and applied at a level of analysis that can be utilised by the teacher. There was also evidence of a large number of teachers, both in the questionnaire responses and in the focus groups, who

understood that individuals vary in style and preference, who did not have a knowledge of theories or models, but who still made common sense and experienced judgements about their students and consequent teaching responses. There was also evidence that the 'picture' of style that a teacher develops about a group of students comes partially from building up pictures of individuals in the group, but also of making group observations. In that way the picture of style built up is an interactive one developed on the basis of observations of individuals and observations of the group. It seems as though these observations are largely of preferences, and are largely associated with the preference dimensions of visual, auditory, reading, hands-on practice, social interaction and need for instructor guidance.

These processes can be summarised and modelled as in Figure 1 on page 18.

What seems evident from the research data is that teachers are best served by an understanding of a model of style that captures student learning behaviours that are both evident and not evident in the classroom, but which are readily interpretable along a limited number of dimensions. The dimensions that are most useful within a model of style are those that a teacher can actually make use of, and that can be operationalised in their teaching. Similarly, a model of instructional preference that sits within the style model as, for example, the Curry 'onion ring' conceptualisation affords is useful provided again that the dimensions of preference contained within the model are at a level that teachers can observe and use.

Teacher use of style and preferences for identification of student characteristics and for adjusting teaching to suit style and preference has been shown in this research to be at a higher and more general level of analysis. Teachers identify styles and preferences at a level of detail that they can effectively use to guide design, delivery and assessment. From that point of view, and without making specific recommendations on any theories of styles and preferences, it is arguable that the form of knowledge about styles that is most likely to be of use to teachers is within theories that are characterised by a low number of measures of teacher-useable style characteristics, and are supported by a test or questionnaire for assessment of style or preference. There are several such theories and tests available in styles (eg. Kolb, 1976; Riding, 1991) and several available in preferences (eg Canfield, 1980; Guglielmino & Guglielmino, 1991). It has also been argued (Smith, 2001) that working at a level of preferences is more practical than at a level of style, since preferences are more amenable to influence from the environment (Curry, 1983; Sadler-Smith, 1996), indicating that teachers can have a greater effect with students by working at the preferences level.

With regard to VET learners' use of style and preferences knowledge, there is little reason to think that these learners would be any different from others already researched by other researchers in other contexts. In all that previous research the almost universal finding has been that the most useful knowledge that a learner can have about styles and preferences is to understand their own. The student focus groups in our study indicated that student understanding of their own styles and preferences was at a couple of levels. First, there was an understanding that there were variations between them in terms of the way that they like to learn, and there was also an understanding that teachers were able to cater for these styles to a greater or lesser degree. Students made comments such as

Self-paced learning doesn't suit everyone

and

>   watching demonstrations first and then doing the task suits me, but I know people who
>   like to try the task first and then have a demonstration straight after to see what they did
>   wrong.

Clearly in those two statements there was an understanding about independent learning, and an understanding of the active-experimentation style suggested by Kolb (1976). Students also revealed a strong understanding of their own learning preferences in regard to hands-on

practice and visual demonstration as opposed to theory classes. When asked how they liked to learn, typical responses were:

> Watching videos/demonstrations

> Practical and problem solving

> Watching demonstrations, looking at people work and then going away to do the task.

Students had a strong and consistent view across focus groups that they preferred to learn through activity rather than through listening. They were also able to recognise and comment on their teachers' attempts to cater for that general preference:

> Teachers adapt to student's preferred learning ways

> Teachers tell us their own work experiences and I learn from those.

However, in teacher focus groups it was common for comment to be made that students would not know what their own styles or preferences are but, at least at the level that students expressed these in focus groups, the evidence in this research is that they do have a fundamental understanding of preferences, at least, and some knowledge of their own. There was also evidence from students that they are able to select learning experiences on at least a partial basis of known preference and were able to make comments such as:

> I like to choose learning where I can do some research by myself and then be a bit creative

or

> I need to think about what I have learned after I have done it, so I like to have a bit of a discussion with the teacher or other students.
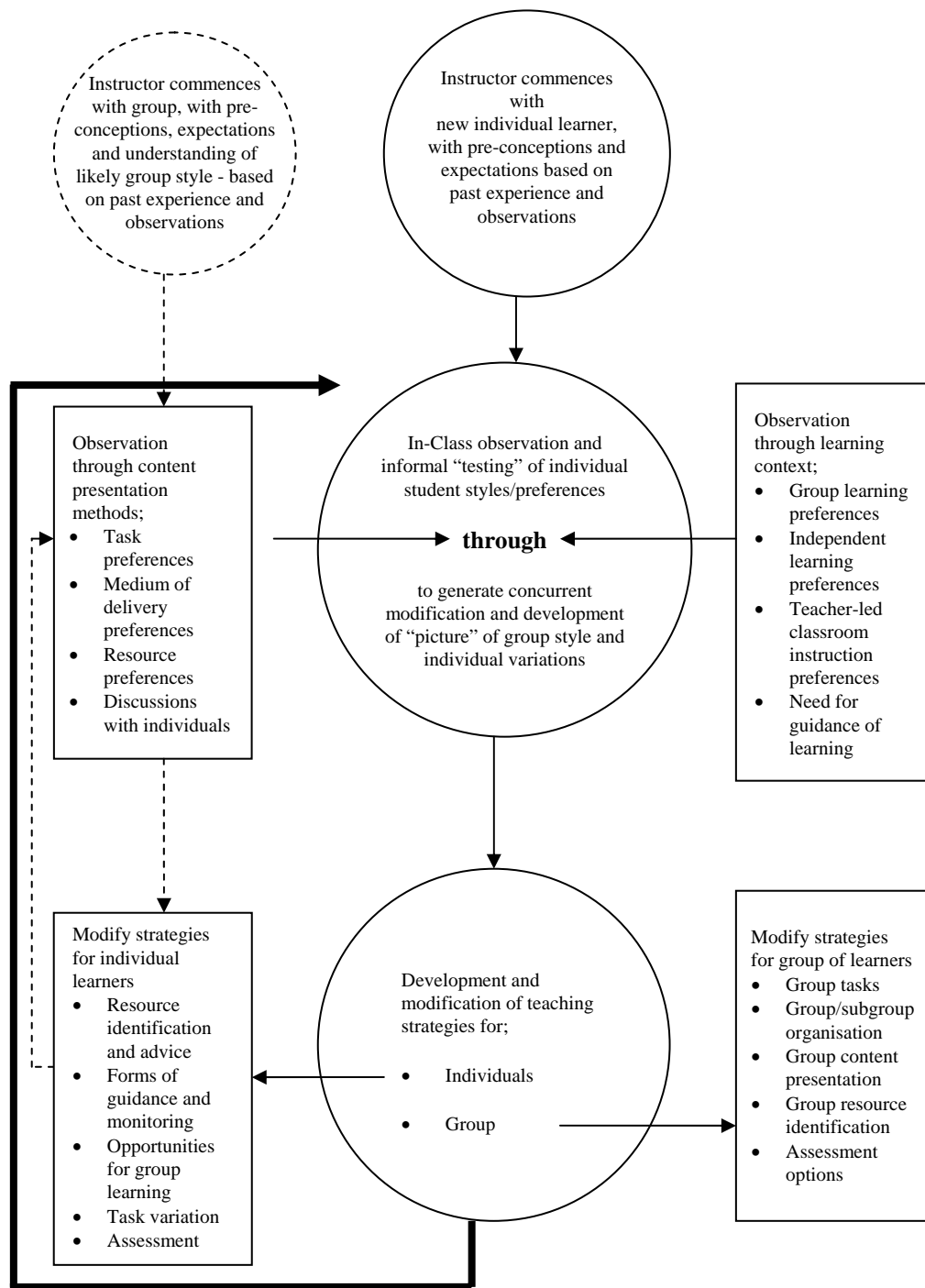
Figure 1 Model for a responsive and interactive pedagogy based on learner styles/preferences

Note: The components of the model linked by broken lines relate to circumstances where instructors are engaged with individual learners rather than groups.

Brief summary

It is not necessary for VET practitioners to have a detailed theoretical model in order to build an awareness of differences in students' learning styles and preferences. However based on the discussions with the teachers and students it is possible to suggest a model which would be of general use in building a broader understanding and responsiveness to learner characteristics. Such a model of learning styles would have a limited number of style characteristics and could be supported by a quiz or questionnaire which would enable the learners and the instructors to build a common understanding of learning styles and preferences along with a common language for discussing these.

Examples of good practice in the use of learning styles/preferences in VET teaching

In this research we extensively interviewed thirteen experienced VET teachers who were identified as interested in student learning styles and preferences, and who took account of these in their teaching and, where possible, in their assessment methods. It is not possible within the body of this report to show each of the case studies, but they can be accessed in full from the Case Studies Support Document for this project. This section of the report represents some conclusions that can be drawn from the case studies.

The case studies indicated that few teachers who understand and use learning styles have any strong understanding or association with any established theory of style. What they do have is a set of teaching experiences that have developed in them a strong understanding of differences and commonalities among individual students they teach, and the groups that they teach. These differences and commonalities have interested them enough to accept them as one form of the broader sets of individual differences that they confront among their students, and that styles and preferences are a valid and legitimate expression of difference that can be taken into account with some reliability in designing and delivering instruction. The experience base of these teachers has given them confidence that such differences and commonalities can be a useful tool in teaching. It was evident in a number of the case studies that the teacher had adopted an understanding of learning styles that was similar to and established theory of style, but the teacher was not aware of the existence of that theory. The most outstanding example of that was the case study teacher who had developed an approach very similar to that of Gardner's Multiple Intelligences theory, but she had not in fact heard of Gardner or the theory. What these findings indicate is that some very functional and effective approaches are taken to style by teachers in the absence of theoretical understandings, but nevertheless developed to quite high levels of sophistication.

Similarly, as part of the observation of style difference as a legitimate form of individual differences, comes an understanding that student who differ from the teacher's own preferred style are not poor learners, but just different learners. The evidence in the literature (eg Darling-Hammond, 2000; Sternberg, 1997) shows that effective teachers adjust teaching to meet diversities in style, while teachers who are not sensitive to style differences are more likely to think more favourably of, and overestimate the achievement of, students whose style matches their own. The teachers in our case studies had moved beyond that to an understanding that differences in style are to be expected, and can be catered towards. In a similar way Rosenfeld and Rosenfeld (2003) have argued that less effective teachers who do not acknowledge differences in individual learning styles are more likely to believe that student learning difficulties are the result of student weaknesses, such as not being capable or not being motivated. More effective teachers are more likely to adopt interventionist approaches based on a belief that success in learning represents an interaction between learner characteristics, the

learning context and teacher behaviour. These were characteristics displayed by our case study teachers.

Case study teachers also reported that attention to style in their teaching had not just been a function of experienced observation of student differences and commonality, but were also a function of the confidence in their teaching that had been developed through experience. They were confident to make an assessment of style, and confident to try (or experiment) with a teaching strategy that their 'educated guess' led them to believe might work. They were also confident to be wrong about these trials, and to in turn try something else instead. What that confidence derived from was a set of techniques they had to make the style identifications necessary, and a repertoire of teaching strategies they could use to respond.

There was also evidence that teachers in the case studies extended student style and preference engagement into new learning experiences by leveraging off styles the student already had established. One case study teacher deliberately looked for the things individual students were good at and then used those good features to build beyond them to develop student comfort with other forms of delivery or resource. Again, although not familiar with style theory, the process used by that teacher has been identified in the literature as one that is powerful to use (eg. Riding & Sadler-Smith, 1997). Another access and participation teacher had used those observations of strength to develop confidence in the student by developing learning tasks that drew on the already-present strength.

Dissemination of these examples of good practice is important, but always a vexing issue in busy workplace such as VET environments. What was evident in the case studies, though, was the willingness and enthusiasm of teachers to share their understandings, experiences and methods. Dissemination of those experiences 'in-house' can be enhanced through some regular forum that discusses issues of teaching and learning, including responding to styles. Additionally, an active web-site where teachers can contribute their own experiences, read those of others, and develop a form of online discussion about style identification and response may be a valuable addition to the array of VET web-sites already available.

Brief summary

Effective teachers understand that success in learning comes from the interaction between learner characteristics, learning context and teacher behaviour. That finding through the case study component of the research is consistent with the findings from the questionnaire that teachers assess style through presentation of content and engagement with learning contexts. Teachers referred to being able to sense or notice, often from quite subtle signals, when a student needed a different approach in order to learn. Those instructors who work with students for brief and widely dispersed periods needed to have their 'antennae' on high alert most of the time they were in contact with students, whereas those whose contact with students was regular and extended over a longer period could build their understanding more gradually. Reflective practitioners not only took responsibility for facilitating genuine learning in their students, but were also committed to their own learning, both formal and informal. They are self-directed learners themselves who adopted and adapted what they were learning to improve their own teaching practice.

Strategies employed by VET instructors and learners to develop self-management of learning

Although there was some confusion among some participants in teacher focus groups between learning independently through self-paced packages, and self-directed learning, the majority of participants made that discrimination accurately. There was a generally held view that self pacing is an independent learning insofar as it was taken often without a teacher present, but it

was recognised that self paced learning was learning in a context of definite learning outcomes to be achieved in a particular way and sequence through the package. Self-directed learning was seen as occurring when the student had some freedom to choose the sequence of learning and the ways in which the learning was to be achieved. One comment that exemplifies the distinction but also raises a concern was:

> Self-paced materials can reduce development of self-direction.

There was some comment that SDL is easier to achieve among students where the learning tasks are practical ones, since once the student was engaged with the practical task there was greater intuition among learners in how to go about it, and more capacity to monitor their learning through the success or otherwise of their experimentation with the task. Additionally, practical task learning was more individual by nature, in that the teacher was not involved with teaching to a group, but rather taught by providing assistance to individuals as they worked through the tasks. The view was expressed here, as an example:

> It's pretty easy to achieve self-direction with practical work, but much more difficult with theory.

A commonly expressed way of developing willingness and confidence with SDL among students was to:

> Introduce small self-directed projects to get students started and used to it

and to build upon these starts to develop more ambitious SDL projects. Some teachers had combined these small tasks with learning contracts such that there was agreement with the student what was to be learned by when, with some informal review of progress to achievement occurring between the teacher and the students. Another reported advantage of small learning projects was that there is opportunity within them for students to negotiate a task that particularly interested them such that they were intrinsically interested in the learning and its outcomes. That intrinsic motivation was frequently seen as an important component of successful SDL in students.

The progress towards the learning goals was seen as important not just to monitor progress in terms of timeliness of achievement, but there was also concern that SDL among students can lead to learning the wrong thing. The following concern was expressed by a focus group involved with Certificates III and IV:

> Don't like totally self-directed approach - OK for people to be given a task to go away and find out about something, but then they need to be able to come back and interact with others about what they've learned.

That importance placed on the role of a group as part of SDL came through in other ways. Some teachers observed that the confidence for individuals to become self directed and to develop the requisite skills could be developed by starting with projects that engaged a group first such that they had developed group-directed learning projects where students could be supported and helped by each other. Another advantage of group based projects was that of teacher span of control, where the teacher was able to monitor the progress and help a smaller number of groups than would be possible with the larger number of individuals.

Support for individuals undertaking SDL projects was seen as essential by teachers in focus groups. There was concern that SDL could also be taken as an opportunity to 'leave it all to students' such that they had little guidance on what to learn, how to learn it, and how they might be ultimately assessed. Together with that concern was a frequently expressed view that SDL is a necessary skill for students to become competent with since:

> We need to be mindful of what happens to students after they leave our course

> People need to be self directed learners to cope with change.

That expressed need for support and development of SDL was underpinned with an understanding that learners differ in their willingness for SDL as a part of style, and their capacity as part of experience. The point was made often in focus groups that

> give some people the resources and framework, and they power ahead. Others can't be self-directed so easily.

The need for development of self-direction among people not inclined to it was seen partly as a challenge for teachers to develop through some of the strategies discussed above, while for some teachers this was a matter of student motivation and willingness to take responsibility for their own learning. This view combined with the view expressed elsewhere in focus groups that for many students it is important that the teacher make the requirements very clear, and provide close instruction throughout the course. Where SDL was to be achieved, teachers in focus groups saw it as important to move students beyond that instructor led model. Learning to learn skills were frequently mentioned in focus groups, but always in a context that these are important but lacking in VET. Some comment was heard that training packages, apart from the Certificate IV in Assessment and Workplace Training, were devoid of any skill development in learning to learn. This was seen by a number of focus groups as being a major deficiency o the extent that there was some suggestion that these skills should be included in all training packages in recognition of their importance in an ever-changing workplace. Associated with the perceived need to develop learning to learn skills was a concern that, without an understanding of the discipline required for SDL and the skills of self monitoring achievement, the other competing things in students' lives would overcome their engagement in SDL and resolve to achieve. As one focus group participant put this:

> Learners need to be well motivated - may go away with good intentions, but don't do the work. Pressures of other commitments deflect them.

Another participant echoed this by saying:

> SDL works for motivated people who have clear goals, but not so well for people with other priorities in life.

The issue of motivation was seen as closely associated with a willingness on the part of students to engage with SDL. The point was made by several focus groups that many students are only undertaking VET because they are required to and, hence, they wish to take the easiest path of 'least resistance'. It was observed that students who are only externally motivated wish to be told exactly what to do and when, and to have as little involvement in their studies or self development as is possible in order to just achieve the required competencies. That observation converges with the previously discussed observation that a number of teachers felt

it important that small projects negotiated with students to engage them with SDL be personally meaningful in order to achieve a level of intrinsic motivation.

Several teachers observed that SDL was not easy for them to either provide to students or develop within them since the industries served by those teachers were generally not favourably disposed towards SDL, preferring instead a more controlled and teacher led context for learning. Again, that observation is convergent with the earlier discussion that some teachers had found the industries they served to be highly traditional in their training process demands and expectations, such that catering to style or preference was also more difficult to achieve.

Other teacher focus groups observed that they frequently had students for very short periods of time such that the development of SDL among students was not possible. In those contexts, even where students were capable and interested in SDL, the timeframe within which training had to be delivered and outcomes achieved was too short for other than a very paced teacher-led approach.

Finally, there were some differences between teacher focus groups at the different AQF levels in relation to the development of SDL. First, teachers involved in groups focussing on AQF levels I and II had much less to contribute to the discussions on SDL development than did those at AQF levels III and IV and levels V and VI. Generally they saw the development of SDL as less achievable and less important at the I and II levels, although there were examples of teachers attempting to develop these skills among students. There was some tension here too, in that teachers in the higher AQF level focus groups did sometimes comment that, where students progressed from the lower to the higher levels, they came to those higher levels with little SDL skill or experience such that the work of teachers at the higher AQF levels was seen to be made more difficult. To some degree explaining that difference and its attendant tension, there was comment that students engaged at the higher AQF levels were more likely to be expected to be self directed in their workplaces, since they were typically doing jobs that changed more often and that made constant upskilling demands upon them.

Brief summary

Students who were more self directed in their learning were generally recognised as being different kinds of learners or even more highly evolved learners than those who required greater teacher direction. Self direction was equated with self motivation and generally identified with some, though not all, students at higher AQF levels.

SDL was acknowledged as a desirable outcome of the education and training process but also acknowledged as difficult to develop in some students. The distinction between self directed and self paced learning was not always understood.

Enhancing learner motivation and capacity to develop lifelong learning mind-sets?

There was a constant theme among teachers in the higher than AQF I and II focus groups that there is a close connection between motivation and SDL willingness. Sometimes that was seen as motivation needing to be present first before SDL could be developed, as discussed above. However, there were also views expressed that SDL development enhances motivation. Additionally, there were views expressed that the two worked together in an iterative fashion such that SDL engagement enhanced motivation which, in turn, served to further enhance a commitment to SDL on the part of students.

An insightful comment made by one focus group was that

> People do self directed learning all the time in areas of their interest.

The issue here is that motivation to learn leads to SDL which in turn is an attractive and natural way to learn where the learning is being undertaken from intrinsic interest. Some teachers had recognised this by developing techniques that enabled students to identify a learning task that interested them and through which the required learning outcomes could be achieved. That recognition of motivation to learn was seen among those teacher participants in the research as being the key to the development of SDL, although requiring guidance and support from the teacher. This comment involved the distinction noted earlier between students who only wanted to gain the qualification and those who had an interest in the knowledge they were acquiring. Within the parameters available to them, some teachers saw that a challenge for them was to move the required learning closer to student interest through discussion with them, and through observation of interest, style, and learning preferences. The connection noted earlier between motivation and catering to style and preference became a part of the mosaic of strategies some teachers reported using in trying to achieve a higher degree of SDL.

Although there was comment that the competency requirements within the endorsed components of training packages limited teacher capacity to generate learning outcomes that may be closer to individual and group student interest and preference, some teachers reported a perceived capacity for some more liberal interpretations. There was comment that by allowing student input into what was to be learned and how provided some learner empowerment and purchase on the learning processes. That was enacted by at least one teacher by providing opportunity for individual students to have input to the group discussion on outcomes and process and, from those individual inputs, a group agreed approach was developed. While it was unclear within the focus group whether that input was directed at outcomes or process or both, it is likely to have been more associated with the processes of learning since there was close to universal acceptance that competency outcomes of training packages were to be pursued with little or no modification. However, there was evidence that student input was used to influence the forms of assessment used.

The importance of developing SDL skills among students as preparation for lifelong learning was not a strongly voiced theme in focus groups but it nevertheless surfaced from time to time. The need for students to be able to deal with the changes that they would confront in the workplace was voiced by several teacher focus groups, most particularly at AQF levels above II. Comment was also made that the skills of identifying learning outcomes that are relevant, and knowing how to achieve those outcomes and recognise progress towards achievement are important skills for VET students to take with them into the workplace. It was also noted that these are the skills both of SDL and of lifelong learning, and that a deficiency in VET is the absence of any systematic development of those skills.

Some focus groups believed that VET provided for the development of SDL (and, therefore, LLL) better in the past, but that these provisions had been a casualty of VET marketisation and competition between providers. This competition had brought with it cost cutting which had reduced institutional capacity to provide for development of those skills (seen as overhead costs), and of cost cutting associated with achieving funding targets set through student contact hours. Finally, because training packages did not typically contain components directed at developing those learning to learn skills, neither students nor employers were willing for time or money to be spent on their development.

Brief summary

The mutual relationship between intrinsic motivation and the students' capacity for SDL was generally recognised and there was awareness that motivation could be increased by bringing course delivery more in line with students' interests, learning styles and preferences. Teachers use a range of strategies which, while not necessarily intentionally directed to this end, may have the effect of enhancing learner motivation, capacity for SDL and hence development of lifelong learning mind-sets.

Towards relevant professional development

Evidence available from outside this project

In developing the PD program we looked first to already published research and practice literature that may have been of value to us. We found little PD literature that was focussed on learning styles and preferences, although we did find some. What we found more of was literature that focussed on PD for practitioners engaged in multicultural education and training environments. That material was useful since it deals, similarly to learning styles and preferences, with issues of group-held characteristics as well as the differences between individuals who form the group. Learning styles and preferences form much the same set of mosaics and challenges to practitioners, since there are group style and preference characteristics evident within VET clients as well as the individual differences that different VET learners bring with them.

An analysis of that material that was external to this project suggests that effective professional development needs to address at least the following:
- Understanding self and personal learning styles and preferences;
- Understanding how these personal style characteristics may be important to oneself;
- Some strategies for identifying the learning styles and preferences of other learner groups and individuals;
- Some strategies for responding to those preferences and styles in teaching terms at group and individual levels;
- A recognition that the requisite understandings and responses are developed in an iterative manner.

Relevant findings from our project

Our NCVER project identified several important things about VET practitioners and their engagement with learning styles and preferences:
- Successful use of the concepts of style and preference in VET teaching doesn't depend on any solid theoretical understanding of style or preference theory, but rather on a mind set that such things exist, and that they are a legitimate expression of group and individual differences. It was common among our research participants for them to have developed effective responses to style and preference difference that were based on experience, good sense, and intuition that these things are important to effective VET teaching;
- Generally speaking there was an understanding that catering to styles and preferences at a group and an individual level enhanced learning experiences for students, represented good professional practice, and had a business advantage in terms of client satisfaction;
- VET practitioners separate their notions of learning style/preference into those things that are associated with the delivery of content to students (eg lecture, discussion, visual presentation, demonstration etc) and those things that are associated with contexts for learning (eg group learning, independent learning, teacher-led instruction, levels of student guidance provided etc);

- Finally, VET practitioners typically use an iterative and responsive approach to identifying style/preference in learners, and responding to it. We have developed a diagrammatic model to show how this process works (shown as Figure 1 on the last page of this Discussion Paper). The model suggests that teachers come to a new individual learner or group of learners with some preconceived ideas and expectations of the learning styles they can expect to engage with. That set of preconceived ideas and expectations will vary in its accuracy as a prediction, and in its sophistication. Once in the learning (or teaching) context, the teacher makes observations of individual styles and preferences and may even 'test' those characteristics in some informal ways with individual students. That observation of individuals provides data not just about those individuals, but the data is also processed by the teacher to modify the cognitive picture formed about the group styles and preferences. On the basis of the data about individuals and the modification of the picture about the group, the teacher then develops and modifies teaching strategies to better cater for individuals and for the group. That data gathering and responsive pedagogical development cycles on an iterative basis as more data is collected and processed, and teaching strategies continue to be modified.

Scoping the PD program

On the basis of the external literature analysis and the results from the NCVER project, we developed the following scope for the proposed PD program:
- An orientation to styles and preferences that is largely observational and pragmatic. Style theory would not form a large part of the PD, apart from making the point that style is a legitimate expression of individual differences that has validity;
- That although PD should not be framed strongly in a context of any particular theory of styles, a knowledge of at leat some style theory would be valuable to teachers in their understanding of student learning differences and their responses to those differences; and to assist students in developing an understanding of their own style;
- Some attention to self analysis;
- An examination of the ways in which style is identified in other individuals and in groups;
- An analysis of the ways a teacher can respond to individual and group style;
- A recognition of the iterative and ever-developing understanding of styles of individuals and groups.

The PD program proposal

Outcomes to be achieved

✧ A working understanding of the concepts of learning styles and preferences and some of the theoretical representations of these;

✧ An understanding of one's own style and preferences;

✧ Practical experience in identifying the styles and preferences of others;

✧ A set of strategies that can be used to respond to group and individual style and preferences;

✧ A personal system for observing style, responding to style and assessing feedback from those responses;

✧ A styles/preferences-based plan of approach to the instruction of an identified learner group.

Components of the proposed PD program

a.   Professional development resource material

It is suggested that the forthcoming NCVER publication *Getting to Grips with Learning Styles* be used as the basis for the professional development program, and be made available to participants.

b.   Self analysis of style

It is suggested that in this exercise teachers would work in pairs. It is also suggested that the Kolb style theory and the Smith preferences model be used as the basis for analysis, since both these models have simplicity, and validity through practice and research. Both models are explained in the NCVER publication. However, the teacher pairs should be encouraged to use any other style or preferences model that they find useful and comfortable to work with.
   - Working in pairs to identify own style and that of the other member of the pair. In this exercise each member of the pair would map his/her style on to the Kolb and the Smith quadrants; and then map the other member's style into the same set of quadrants. Pair members would then discuss those analyses, the basis on which they were made, and how the self-analysis might vary from the analysis completed by the other;
   - Pair members would then identify ways in which each pair member likes to learn;
   - Pair members would then identify together the teaching strategies that suit each member of the pair.

c.   Style identification in others

Groups of four to six teachers work together to identify the strategies they each use to make observations of style of students in groups and as individuals in terms of their:
   - Preferences for different sorts of tasks
   - Preferences for different forms of teaching medium
   - Resource preferences
   - Behaviour during discussions
   - Group learning preferences
   - Independent learning preferences
   - Teacher-led classroom instruction preferences
   - Preference for teacher guidance of learning

Questions for further discussion here relate to the effectiveness of each of these forms of observation or 'data gathering' on students; and what may be some new ways of making these sorts of observations.

There may be value in teachers working within their own program groups for this exercise, or there may be value in mixed program groups to hear of different approaches that may be used in different programs.

d.   Responding to styles and preferences

Here it is suggested that teachers work in focus groups within their program area to complete the following tasks:

   - Identify collective knowledge about typical learner group styles and commonly observed individual variations;
   - Sharing the ways in which members develop teaching strategies to suit group style, and response to individual styles;
   - Identifying the reasons for catering to learner style in designing and delivering teaching.

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e.   Planning style-based teaching

Working within the program group context, each individual teacher chooses a group they have taught as the focus for the first part of this exercise. The exercise requires the individual to develop a plan for:
- A set of observation techniques that can be used to identify student group and individual styles and preferences through observation of students as they work with content presentation; and through the observation of preferred learning contexts;
- A brief analysis of group style and the individual variations that were present in the group under focus;
- A set of teaching strategies designed to cater to typical group styles and individual differences within those styles;
- A set of strategies that can be used to further develop student learning styles and preferences to enable students to engage in a broader set of learning experiences than current style would suggest.

The second part of the exercise involves individual teachers bringing their plan to the wider group for presentation and discussion with a view to:
- Understanding and challenging each other's plan;
- Share experiences across groups to identify different ways in which individuals teachers make observations about style, develop teaching strategies to suit, and challenge students to expand their style/preference repertoire.

At the conclusion of the group exercise individual teachers modify their own plan to include new ideas developed from the group session.

f.   Action learning and implementation

In this final phase the teacher takes the plan generated at e. above into the classroom for implementation. At the teaching occurs over a period of time, the teacher would note in a journal observations about:
- Student response to the learning style-based teaching delivery
- Types of observations made by the teacher in order to modify the plan;
- Detail of the modifications made to content presentation and to learning contexts;
- Use of feedback from observations of students that led to further modification.

Finally, a last program-based focus group to identify and share experiences from the implementation, specifically about:
- Student group and individual style/preferences characteristics;
- Useful observational and trialing techniques used to 'test' the original plan;
- The sort of data used to modify the plan;
- The modifications and their effectiveness.

Brief summary

Teachers acknowledge that much of their understanding about students' learning styles and preferences has become intuitive and has developed as a result of their own professional interests coupled with teaching experience and experimentation over time. Because teachers in the VET sector are generally teaching in areas in which they have studied and worked, they often have an expectation that their students' ways of learning will be similar to their own. This expectation is quite often justified, for example, trade teachers working with apprentices in their trade field, however with the broader student cohort ranging from school students to mature age general interest students, the assumption of learning styles similarity does not hold. Teachers who are also active lifelong learners themselves are able to draw on their awareness of themselves as learners, to develop different approaches to working with their students. There is clearly a link between teachers' intrinsic motivation, SDL and a lifelong learning mind-set, in

respect their awareness of students' learning styles and preferences. The implications of this for professional development include:

- Catering to teachers interest in and developing awareness of themselves as learners
- Drawing on, and drawing out, the knowledge and awareness of learning styles that teachers have already developed from experience
- Allowing for differences in interest and perceptions of relevance among teachers at different stages of their teaching careers.
- Providing for sharing of knowledge and understanding and collegial support

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Data collection instruments

Questionnaire - Learning styles in vocational education and training

NOTE: BEFORE FILLING OUT THIS QUESTIONNAIRE

I have read the Plain Language Statement describing the research. By filling out this questionnaire I am acknowledging my willingness to participate in the research by anonymously completing the questionnaire. I understand that the questionnaire I am filling out will not be made available to any person other than the research team.

In answering this questionnaire we would like you to think about one particular class that you teach.

Please tell us something about yourself:

Your age: ————————   *Your gender:* ————————

*The Certificate level of the class you are thinking about when you answer this questionnaire:*_____

Please remember, in answering this questionnaire we would like you to think about one particular class that you teach.

1.   *I can identify which of my students* like to learn from visual sources such as videos and pictures
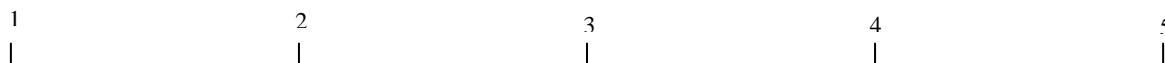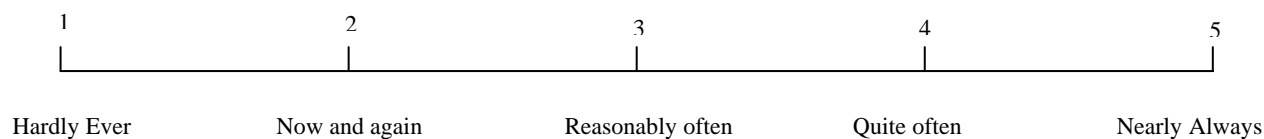
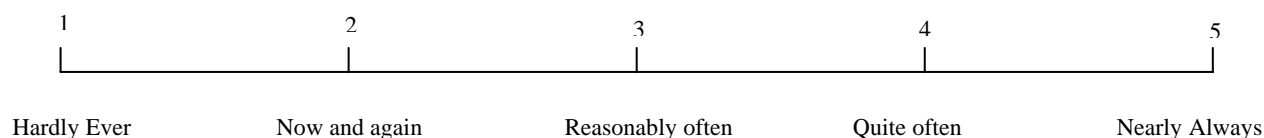| 1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

2. *I can identify which of my students* like to learn from me giving them lectures in class

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

3. *I can identify which of my students* like to learn from demonstrations of skills that I provide or organise someone else to provide

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

4. *I can identify which of my students* like to learn from doing the actual hands on task they are learning about

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

5. *I can identify which of my students* like to learn from reading learning materials that I prepare

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

6. *I can identify which of my students* like to learn from reading learning materials supplied by publishers

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

7. *I can identify which of my students* like to learn through discussion with me

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

8. *I can identify which of my students* like to learn through discussion with each other

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

9. *I can identify which of my students* like to learn by themselves

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

10. *I can identify which of my students* like to learn in a group setting

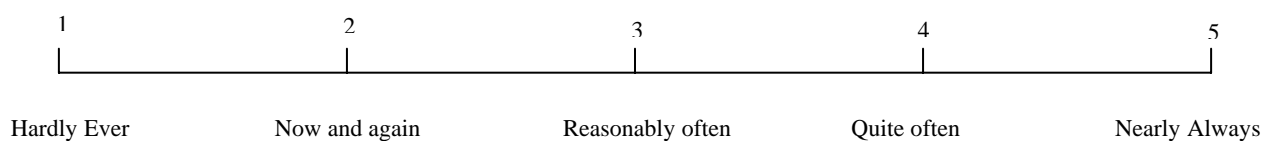| 1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

11. *I can identify which of my students* like to learn with me giving them close guidance

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

12. *I can identify which of my students* are good at being self-directed learners

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

13. *My students learn best when* I design my teaching materials to suit their learning styles

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

14. *My students learn best when* I design my teaching delivery to suit their learning styles

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

15. *It matters to my students* whether or not I try to cater to their learning styles

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

16. I believe in developing my teaching to suit the learning styles I find most typical of my students

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

17. I spend time trying to identify the learning styles of my students

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

18.   *I develop my teaching* to suit my students' typical learning styles

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

19.   *I can identify* some typical learning styles among my students

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

20.   My understanding of learning styles is

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

21.   When I design assessment for my groups of students, I take their typical learning styles into account

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

22.   I take learning styles into account when I design individualised assessment for my students

1	2	3	4	5
Hardly Ever	Now and again	Reasonably often	Quite often	Nearly Always

23. Have you ever participated in a Professional Development Program about learning styles?   Yes/No

24. If you answered 'Yes' to question 23, can you please tell us what learning styles theory (or theories) were discussed in the Professional Development Program?

_____

_____

_____

25. Tell us briefly how that Professional Development Program has assisted you in your teaching

_____

_____

_____

Thank you very much for your time.

Teacher focus group questions

1. *Organisation*

Focus groups comprising around six instructors will be set up in each of the six VET providers to gather information on current understandings of the ideas of learning styles, their potential value to VET teachers and learners, and their practical application in teaching; perceptions of differences between client groups; forms through which the research and theory on learning style could be made accessible to VET practitioners; understandings of self-directed learning, and strategies employed to develop SDL among learners; views on the capacity for styles information to be used within the Training Package paradigm; early identification of good practice that may be followed up for more detailed research and analysis.

In each provider we would expect to conduct three focus groups. One focus group in each provider would draw on instructors involved in delivery of Certificates I & II; one drawn from Certificate III & IV instructors; and one from Diploma or Advanced Diploma instructors. Focus group sessions will be approximately 90 minutes each.

2. *Questions for focus group discussion*

- Let's just explore for a while what we all understand to be student learning styles, and whether or not we think they are important to us as instructors.
- Are the notions of learning styles important to students to, do you think?
- Can we talk a bit now about how you take styles into account when you are planning and delivering our teaching? How do you identify the styles of individuals and groups?
- Do groups have typical styles in your opinion? Do you use those typical features in your teaching? What typical group styles do you see in the students you teach?
- What do you do to accommodate the features of learning style that you see among your students?
- What sort of scope do you see for using the notions of learning styles within the requirements of training packages?
- Would it be useful to have more information available to you on learning styles? What sort of information would be useful? And where would you best be able to access the information?
- Do you see the development of self-directed learning among your students as something worth doing? How do you go about doing that with your students? Does what you are doing work?
- What Professional Development about learning styles have you been involved in? What was the focus of that PD? How has it been useful to you in your teaching?

Student focus group questions

1. Organisation

Three Focus groups of students in each provider will be set up among students to mirror the pattern of the focus groups of instructors and focus on: student knowledge of their own styles; styles students typically use with different forms of learning (eg propositional, procedural, dispositional learning; perceived mismatches between student identified styles and their instructional experience in VET; examples of good practice as identified by students, and able to be researched in more detail as part of this research.

2. Focus group questions

- Do you have an idea about how you best like to learn?
- Can you each talk briefly about how you like to learn?
- How do you like to learn new skills and processes that you actually have to carry out and do?
- How do you like learning new facts and ideas in your course?
- How do you like to learn how to behave properly in the workplace?
- In most of your classes in TAFE, do you find that what you're asked to learn suits the way you like to learn?
- Can you give some examples of things you have been asked to do that really suit the way you like to learn?
- Can you give some examples of things you have been asked to do that you found really didn't suit your way of learning at all?

Case Study Themes

Level of analysis

Here the overall focus of the theme is to get an insight into the level at which the instructor identifies learning style characteristics of students. Is this observed at a fair level of detail, or at a reasonable general level.

- Think of a couple of students in your classes this year and describe their learning styles in general terms.
- Now thinking of the same students, describe their learning styles in quite detailed terms.
- How do you make those identifications of student styles?
- Which of those descriptions is closest to what you use in your approach to teaching those two students?
- Which of these two descriptions do you find most useful for teaching?
- What sort of teaching decisions do you make on the basis of those descriptions?
- Are there any occasions when you would use the description that you have said is the least useful in your teaching?

VET learning styles and preferences

Here the overall focus of the theme is to develop some insight into what the teacher sees as being some typical characteristics of the students he/she teaches, and how that information is used in developing teaching sequences. A later theme investigates the differences that he/she sees in the groups of students they teach, and how those differences are taken into account in making teaching decisions – some discussion of that might be unavoidable in this theme, but suggest leave the bulk of that discussion to later.

- Do you think there are some features of your students learning styles that are quite common among the individuals in the groups you see?
- What do you see as some of those common features?
- How common are those features? Do you see them in nearly every student? A lot of students? Or even just a small but identifiable minority of students?
- What do you do with those features when you make decisions about planning or delivering instruction?
- Do you take account of those features in identifying learning resources that you think might be useful to students?
- Have you found any particular theorist or writer to be the most useful to you when you are thinking about common learning styles and features and how you might use them?

Stability and context

This theme is designed to identify how stable, and/or how contextual the teacher sees learning styles to be, and how those views are used in planning and delivering teaching.

- We've identified a few learning style features that are common among your students. Do you see those features as being quite stable, perhaps like a part of the person's personality? Or do you see those features as pretty contextual, so that if the student was put into a different situation, those features may not be so evident?
- How do you believe the learning context or learning tasks might affect the learning styles and behaviours that you observe?

- When you plan or deliver your teaching, do you vary context and tasks with learning differences in mind? If you do that, how do you go about it, and what do you do?
- Where you think that a particular learning style or learning behaviour is just a part of that student's personality, do you use that information to help the student? If you do, how do you do that?

Variability and stereotyping

The theme here is to gauge how the teacher might balance the identification of some usable and 'common' characteristics among his/her students against an understanding that these students are still individuals with individual characteristics. The theme will also explore how the teacher adopts, or manages not to adopt, a stereotype of students based on observed 'common' characteristics.

- We talked a little while ago about some of the learning characteristics of your students that are common enough for you to use to help in planning and delivering your teaching. Setting those similarities aside for a moment, I wonder if you could talk a bit about how the students differ from each other as well.
- In planning your teaching and working in the classroom, it must be a difficult balancing act for you to use the similarities between students that you identify and yet, at the same time, keep remembering that these are all different people. How do you do that? What sorts of characteristics do you see as important to treat as similar enough across the students, and what sorts do you tend to treat as differences?
- Is some of your teaching preparation and delivery aimed to take account of similarity, while other things are planned for individual differences? If they are, can you tell me how you distinguish those, and how you use them for more effective teaching?
- If we were to talk about a 'typical' student in one of your classes, what would that typical student be like? How 'typical' is that person? Is that 'typicalness' useful to you in your teaching? Does that notion of 'typicalness' sometimes get in the way of your effective practice?

Utility for teaching and learning

The theme here is to identify whether or not the teacher sees a value in students or learners having some understanding of the notion of styles, and having some idea of their own style. The theme also includes discussing how those understandings might be useful, and whether or not the teacher makes deliberate or tacit use of the knowledge.

- What sort of value do you see in making your assessment of the individual and group learning styles of students that you teach?
- How do you make use of that assessment you have made?
- In what ways do you think making your assessment helps you?
- In what ways do you think it helps your students?
- Do you make any attempt to get students to understand their own learning styles?
- If you do, how do you go about creating that awareness?
- How do you help students to use that information about themselves?
- Where they do you use it, does it seem to you to help them?
- How do you observe it helps them?

Development of styles

The theme here is to ascertain if the teacher helps students to develop their learning styles and learning strategies so that students broaden these and broaden their capability to engage in a wider range of learning contexts.

- Do you find that sometimes a student's learning style makes it difficult for him or her to engage with learning sequences that are outside the preferred style?
- What does the student do in these cases? What do you observe about them?
- Do you do anything to help the student broaden the learning styles and strategies that they use?
- What do you do to help here?
- Do you think it works?
- What, typically among your students, are the adjustments to style that you find yourself making?

Assessment practices

The theme here is to identify what, if anything, the teacher does to provide a range of alternative assessment tasks to students so they can choose one that suits them most.

- Do you have opportunity to provide students with alternative assessment tasks so that they can choose the one that they believe best suits their way of learning?
- What sorts of things do you do in providing those alternatives?
- On what information basis about your students do you design and provide the alternative tasks?
- Do you believe students choose among the alternatives fairly wisely and well?
- Do you help students to choose and, if so, how do you do that?
- What are some examples of these different assessment tasks?
- How do you make use of assessment to assist and advise/guide the learner about their learning?

Professional development experiences

The theme here is to explore:

- PD experiences the teacher has engaged in;
- The learning styles theories that they are familiar with
- What use these theories have been in practice and how
- Whether they work in the framework of a favourite theory (if so what?) or do they adopt a quite eclectic approach that is their own?

Professional development focus group questions

Objectives of the Focus Group Session

A. To assess and comment on the PD program proposed in the following paper, in terms of outcomes, structure, relevance, and feasibility. Specifically:

- Are the outcomes of the proposed PD program about right? How might they be improved?
- Is the structure proposed likely to be one in which VET practitioners will engage? Does the structure provide for the development of sufficient understanding? Is too much expected of participants? Or too little? How might the structure be improved?
- Is the focus of the PD program and its outcomes sufficiently relevant to VET practitioners?
- Is the PD program capable of being feasibly implemented in RTOs? What would be barriers to implementation? How might any perceived barriers be removed?

- Who should conduct the PD sessions? Should it be a sharing experience among colleagues with no learning styles specialist present, but just facilitated by a member of RTO staff? Should it be a learning styles 'expert' who conducts the sessions?

B. To provide comment on how best to position the proposed PD program within the wider strategic mission of the RTO:

- Does catering to student learning styles have a place within the organisational strategic commitment to client-centred learning? If so, how does it fit? What other client characteristics (besides learning styles) are also focussed upon in your organisational set of client centred learning strategies?

- With what other current PD initiatives within your organization would PD on learning styles be best associated?

PART 2: LITERATURE REVIEW OF LEARNING STYLES THEORY AND RESEARCH

Peter Smith

Review of learning styles theory and research

Purpose of this review

This literature review forms a supporting document to the major project *Accommodating learning styles: relevance and good practice in VET*. The document provides an exhaustive review of theory and research in learning styles, preferences, and strategies, and makes considerable use of the research and theoretical literature. It has been written for the benefit of researchers and others who have a need for an understanding of the breadth and depth of literature available. The review is not a necessary part of the major report and, where it is used, it should be viewed as a supporting and adjunct document only.

The review is structured to first examine the conceptualisations of styles, preferences and strategies, and the confusion that has surrounded those terms and their usage, leading into an examination of a coherence that is emerging from the literature and in the field. There are a number of well research variables among learners and learning contexts that have been shown to have an influence over the individual styles and preferences of learners, and the literature review spends some time in identifying and discussing those. Next we turn to the issue of whether or not styles and preferences can be developed in learners – how much are they part of personality and not particularly amenable to change through external influence, and how much might they be ascribed to environmental influences. The ideas surrounding the efficacy and value of a knowledge of style are examined next, leading into a discussion of the contested area of the value of matching teaching delivery to learner style. We then examine whether or not the question of the value of matching teaching to learning style may be related to the level of our matching ambition or, put differently, how a very detailed and specific matching of teaching to style may disappoint, while a less ambitious and less detailed form of matching may prove to be more effective. Finally we look at some ideas on how a knowledge of style and preference can be used to assist in making training decisions, leading into some examination of self-directed learning as a style characteristic becoming more important to VET.

The final section of the review draws some conclusions about learning style and preference theory, particularly as they may apply to VET.

Conceptualising and defining style – many approaches

Throughout the literature there is inconsistency in the conceptualisation and usage of the various terms surrounding 'learning styles'. Misko (1994a) in her review of research on learning styles writes 'Learning styles can be defined as an individual's characteristic approach to learning' (p.2). In writing for an audience of teachers and instructors, Misko's definition is useful in that it conveys quite clearly a sense of individual differences, of stability, and the need for instructors to be aware that not all people learn in the same way. As a conceptualisation to assist in theoretical development, however, the definition is wanting. First, the definition conveys a view that an individual's learning style is static and commonly applied to all learning situations. That view is at odds with writers such as Kolb (1976), Laurillard (1979), Marton and

Säljö (1976) and Entwistle (1996), who argue that the learning style of an individual can vary with context and content.

Second, the Misko definition employs the term 'approach to learning' to aid in achieving clarity. Writers such as Biggs (1990) and Entwistle and Ramsden (1983) use the term 'approaches to learning' quite separately from the concept of learning styles. Biggs (1990) uses the term 'orientation to learning' in his 3P (Presage, Process, Product) model of student learning, to refer to a learning approach that students would characteristically adopt in most circumstances. He sees orientation to learning as a trait of the learner. In Sadler-Smith's (1996) nomenclature, that is a 'learning style'. Biggs also uses the term 'approach to task' to describe what Sadler-Smith (1996) would call a 'learning strategy' used for a particular task. Again, there are varying uses of terms between writers, reflecting somewhat different conceptualisations. Also, Biggs uses the term 'approach to learning' in the first phase (Presage) of his 3P model to describe student characteristics, including 'orientation to learning'. Smith (1996) has suggested that the term 'orientation to learning' used in Entwistle and Ramsden's (1983) *Approaches to Studying Inventory* (ASI) is comparable to Biggs's term 'approaches to learning'. Smith has made her suggestion on the basis of Biggs's (1990) comment that both his own *Studying Process Questionnaire* (SPQ) (Biggs, 1987) and Entwistle and Ramsden's ASI were designed to test students' approaches to learning in the Presage phase. Biggs (1993) observed that the term, 'approaches to learning' has two meanings, and can be used to describe a situationally specific learning behaviour, or to describe an habitual predisposition.

Also interested in individual differences in learning Kolb (1976), working with a Jungian approach to psychological type, suggested that individuals learn and solve problems by progressing through a four stage cycle: *Concrete Experience (CE)*, followed by *Reflective Observation (RO)*; which leads to the formation of *Abstract Concepts (AC)*; which results in the testing of hypotheses through *Active Experimentation (AE)*. Kolb viewed CE and RO as being two ends of a single continuum, and AC and AE as two ends of a second, orthogonal continuum. These two continua result in four quadrants, and learning style is described as the place an individual characteristically holds in that plane. Kolb named the four resultant learning styles the *accommodator*, the *assimilator*, the *diverger*, and the *converger*. Accommodators for example, Kolb argued, learn by concrete experience and active experimentation, relying on intuition and trial and error methods of problem solving. In Sadler-Smith's (1996) terms, though, these learning styles may be described as cognitive strategies. Biggs would call them 'approaches to learning' and 'approaches to task'. This example indicates very clearly the confusion between the numerous different terms used in the literature to describe what appear to be fairly similar constructs. Kolb also argued that a person may prefer one style in one situation, and another style in another situation, meaning that the position a person occupies in the two dimensional plane can vary with the learning task. However, Kolb also argued that in the same learning context the learning style adopted on each occasion is likely to be the same. McCarthy's (1979) development of the 4MAT system of matching teaching to learning styles was based on Kolb's theory, but also represented an attempt to integrate Kolb's ideas with the left brain-right brain theories that were popular in the 1970s and early 1980s.

Canfield (1980) took a quite different approach to the study of learning styles and, instead of being interested in examining the underlying cognitive dimensions that may describe learning style, he opted to examine the preferences students display in their learning. The *Canfield Learning Styles Inventory* (CLSI) (1980) provides sixteen learning preference subscale scores in three major categories:

✧ *Conditions of learning,* where eight scales describe student preferences for the learning environment;

✧ *Content,* where students express relative preferences for working with numeric, qualitative, inanimate, and people related content;

✧ *Mode,* where students express their preferences for different delivery media.

The CLSI has been largely used by researchers and practitioners interested in applied outcomes, such as implementing preferred conditions, content and modes into learning programs to cater more closely to student learning preferences (eg. Alsagoff, 1985; Heikkinen, Pettigrew & Zakrajsek, 1985; Smith and Lindner, 1986; Smith, 1999, 2000a, 2000b). Riding and Rayner (1998) acknowledge, with some criticism, the practical value of preferences inventories for the design of instruction to suit particular learners, or groups of learners, but theoretical work using the CLSI is scant in the literature. In a principal components analysis, however, Gruber and Carriuolo (1991) developed a learner typology based on the CLSI, where dimensions of Conceptual–Applied Content, and Social–Independence were indicated. Working with Australian VET students, Smith (2000a) has developed a similar typology with a dimension of Nonverbal-Verbal learning preferences, and a Self-directed-Dependent learning preference. Canfield (1980) has contributed to the confusion in terms surrounding learning styles by naming his inventory the 'Canfield Learning *Styles* Inventory' (italics ours). The CLSI in fact measures learning preferences, which describe a learner's preference for one form of instruction over another. Adding further to the confusion, Dunn *et al.* (1995), have used the term 'learning style preferences' to describe concepts in this field of research.

Part of the confusion has arisen from the interest of psychologists in learning styles as part of personality theory, where the view is taken that the characteristics of style are relatively stable traits. For example, Lawrence (1984, 1993) has reviewed the extensive work employing the Myers Briggs Type Indicator (MBTI) as a device to assess learning style. The MBTI was developed as a personality test, but there have been a number of attempts to relate the results on that test to an individual's learning style. Indeed, Lawrence has developed a quite extensive set of instructional recommendations that are based on the MBTI. Similarly, Shadbolt (1978) has used the Eysenck Personality Inventory to assess the relationship between personality constructs and preference for structured or unstructured learning situations at university level. Eysenck (1978) has extensively reviewed literature on the relationship between personality and learning style, again with a view to identifying stable predictors of learning behaviour.

Another form of attempt to relate the learning style characteristics of individuals to broader psychological concepts is Gardner's theory of multiple intelligences. Gardner (1983; Gardner & Hatch, 1989) have suggests that there are nine intelligences – logical-mathematical, linguistic, musical, spatial, bodily kinaesthetic, interpersonal, intrapersonal and existentialist. The degree to which each of these intelligences is possessed by an individual represents a profile of cognitive style, and the theory suggests that different people will engage more or less effectively with learning in each of these areas as a function of the degree to which they are characterised by each intelligence. Again, these intelligences are seen to be relatively stable within any given learner.

In pursuit of greater coherence among terms and concepts, Keefe and Ferrell (1990) have combined the concepts of learning preference, information processing style, and cognitive style, when they suggest that learning style is demonstrated in the pattern of behaviour and performance through which the learner approaches educational experiences. Schmeck (1988) has proposed a similar relationship between the various constructs by suggesting that *personality traits* are expressed in *learning styles*, and that learning styles are reflected in *learning strategies*. Learning strategies are, in Schmeck's model, manifested through *learning tactics* which result in *learning outcomes*. Through this linking of the concepts, Schmeck has been able to relate personality with learning styles and strategies, and to provide a useful distinction between styles and strategies. Schmeck has suggested that when a learner is inclined to use the same strategy across a number of varied situations, that probably consitutes a learning style. He draws attention to the reservation of the word *style* by Entwistle and Ramsden (1983) to stable and trait-like approaches to learning. Entwistle and Ramsden have preferred the term *orientation* to describe consistency in approach to learning.

At the same time, the term 'cognitive style' appears to be widely accepted in the literature to indicate the way an individual habitually processes information from receiving a stimulus to

generating a response. Although there are several approaches to the study of cognitive style such as, for example, Guilford's (1956) *convergent* and *divergent* thinkers, or Pask's (1976) *serialists* and *holists*, there is not wide divergence claimed for the meaning of the term. Likewise, the term 'cognitive strategy' appears to be generally used to mean the methods by which an individual organises information to execute a particular task and, again, there seems to be reasonable agreement on that usage. Theories of cognitive style and their implications for learning are exemplified in the work of Witkin, of Riding, and their respective colleagues.

Riding and Cheema (1991) have attempted to integrate the many conceptualisations of style, and have developed a two dimensional model of cognitive style. In that model, one dimension is conceptualised as Wholist-Analytic, and the other as Verbaliser-Imager. Riding and Cheema (1991) and Riding and Sadler-Smith (1992) have suggested that the Field-dependence/Field-independence dimension (Witkin *et al.,* 1977) is a label used 'within the Wholist-Analytic Cognitive Style family' (Riding and Sadler-Smith, 1992, p.324), with Field-dependents lying within the Wholist category. Riding (1997) has also provided evidence that these two underlying dimensions of cognitive style are quite fundamental and may reflect neural processes in the two hemispheres of the brain, and that they are independent of 'learning' style. Similar suggestions of neural correlates had been made earlier by Doktor (1978) and Doktor and Bloom (1977), and again more recently by Thies (2003).

Riding and Sadler-Smith (1992) and Sadler-Smith and Riding (1999) have also begun to investigate the relationship between cognitive style and instructional preference, in an attempt to develop predictions to assist the instructional design and delivery of learning programs to meet the needs of different groups of learners, or individuals. In particular, Sadler-Smith and Riding (1999) have identified a highly significant preference among Wholists for non print-based media of instruction, for collaborative learning methods, and for more informal types of assessment. These findings are consistent with Riding's (1991) suggestion that Wholists are sociable and socially dependent. Riding and Sadler-Smith (1997) have also suggested that Wholists process information simultaneously, while Analytics break it down into parts and process it sequentially. Riding and Sadler-Smith (1992) have shown that imposed structure in learning is valuable to Wholists who may otherwise have difficulty breaking information down to provide a structured sequence.

Riding and Sadler-Smith (1997) describe the Verbal-Imagery dimension of cognitive style in terms of the habitual mode of representing information in memory, with verbalisers' representations being in words, and imagers' being pictorial. Further, they suggest that imagers have a preference for information to be presented in pictorial, diagrammatic or, presumably, real object form. However, the Sadler-Smith and Riding (1999) paper was not able to establish a strong and consistent relationship between the Verbal-Imagery style and instructional preferences. The Wholist-Analytic/Verbaliser-Imager model suggested in Riding's work and that of his colleagues does provide a useful framework for the development of relationships between learning preferences and instructional design.

Riding and Sadler-Smith (1992) have reported that the Wholist-Analytic dimension of cognitive style has derived from the Field-dependent–Field-independent dimension originally proposed in the work of Witkin *et al.* (1954,1972), Witkin *et al.* (1962, 1974), and Witkin (1976). Witkin *et al.* (1977) have reviewed extensive research, carried out since the 1940s, that indicates that the field-dependent–field-independent dimension may be applied to a number of differences between individuals. Originally, work on field-dependence–field-independence was focussed on perception, and the variations between people in their ability to perceive part of a perceptual field distinctly from the surrounding perceptual field. The conceptualisation of field-dependent–field-independent was later applied to problem solving, where the solution to the problem depends on extracting a critical element from its context of presentation, and restructuring it for use in a different context. Witkin *et al.* (1977) have reviewed other research indicating the relevance of the field-dependent–field-independent cognitive style differentiation to a preference or otherwise for educational content and context structure; to attentiveness to

prevailing social frames of reference; to preferences for social interaction; and to preferences for the abstract or the theoretical.

Towards an emerging coherence

Drawing attention to the fact that there are a number of conceptualisations of the term 'learning styles', Curry (1983) made a systematic and influential attempt to organise the theories and the multitude of constructs used in learning styles research. As Curry (1983, p.3) lamented, the term 'learning styles' is overused and has been employed to describe a wide variety of conceptualisations and measurement devices. Restricting her analysis to intended learning, she distinguished between the terms:

✧ *learning style* to refer to the general area of interest in individual differences in cognitive approach and process of learning. Curry's view was that the term *learning style* is so over-used that she would avoid it other than to describe the general area of interest;

✧ *instructional preference,* which is the individual's choice of environment within which to learn, and modulated by all person-environment interactions;

✧ *information processing style,* which is the individual's intellectual approach to assimilating information following the classical information processing model (orienting, sensory loading, short-term memory, associations, coding, long term storage);

✧ *cognitive personality style,* which Curry defined as the individual's approach to adapting and assimilating information, but being a stable characteristic that does not interact with the environment;

✧ *self concept about learning,* which is the person's conscious perception about the way he or she learns, and affects the choice made about learning alternatives;

✧ *learning strategy,* whereby a learner translates information from the form provided into a personally meaningful form. Learning strategies are used by learners to cope with the particular learning environment;

✧ *learning ability,* which is the learner's potential performance on a defined task in a defined setting.

Recognising the types of theory that had been postulated, some of which are reviewed above, Curry organised the various models of learning styles into three layers, likening them to the layers of an onion. The inner-most layer of the onion in Curry's model represents stable characteristics that can be related to personality, while the outer-most ring represents characteristics of the learner that are influenced by the environment. In that way Curry has attempted to resolve the trait or state argument as it applies to the general field of learning styles:

✧ *instructional preference,* referring to the individuals' choice of environment in which they learn was the outermost layer of the onion. Her expectation was that that this layer of *preference* is the least stable as a characteristic of any given individual, and is likely to be influenced by what is being learned and the learning context. At the same time, this changeable characteristic meant to Curry that this layer interacts most with the environment and is the layer most useful to vary in the provision of particular teaching methods in particular situations;

✧ *information processing style* was Curry's second layer of the onion which, because it doesn't directly involve the environment can be expected to be a more stable characteristic of the individual but, nevertheless, still modifiable by learning strategies;

✧ *cognitive personality style* is the innermost layer of Curry's onion and is defined as the individual's approach to adapting and assimilating information. This layer represents an underlying and relatively stable permanent personality dimension.

Figure 2: Three layer 'onion ring' model of learning style (from Curry, 1983)

Instructional preference

Information processing style

Cognitive
personality
style
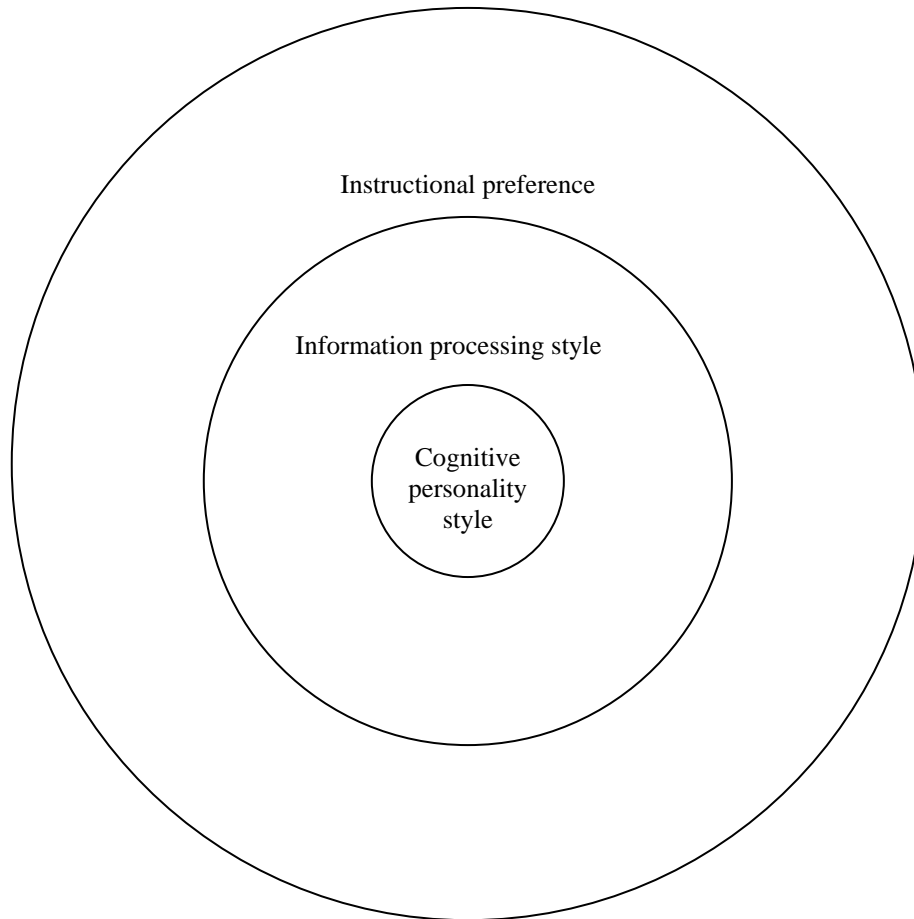
Extending on Curry's (1983) model, Sadler-Smith (1996) has identified five different terms to describe what he sees as quite different constructs used in the literature. As with Curry, the Sadler-Smith model suggests inner-most layers to be stable and related to personality, with the layers becoming more influenced by environment (less trait-like) as they move outwards from the centre of the onion:

✧ *learning preference* - the favouring of one particular mode of teaching over another;

✧ *learning strategy* - a plan of action adopted in the acquisition of knowledge, skills or attitudes through study or experience;

✧ *learning style* - a distinctive and habitual manner of acquiring knowledge, skills or attitudes through study or experience;

✧ *cognitive strategy* - a plan of action adopted in the process of organising and processing information;

✧ *cognitive style* - a distinctive and habitual manner of organising and processing information.

The Sadler-Smith nomenclature is useful in that it provides some differentiation between the terms, and some guidance on how the terms might be used. However, it is not always a simple matter to classify learning behaviours to one category or the other. For example, is a learning strategy habitually employed in a certain set of contexts really a learning style, as suggested by

Schmeck (1988). Sadler-Smith has based his nomenclature on Curry's earlier work, and has elaborated her onion rings to contain six concentric layers. The outermost layer provides for *learning preferences* using Curry's definition, followed by *learning strategies* in the next layer, with the further layers being *learning styles, cognitive strategies, cognitive style*. The innermost ring comprises the *central personality dimension*. This conceptualisation, in the same way as Schmeck's (1988), relates central personality characteristics, which are considered to be fairly stable, to the other constructs in a meaningful way that also embraces increasing changeability due to context and content in each successive outward layer of the onion.

Figure 3: Six layer 'onion ring' model of learning style (from Sadler-Smith, 1996, p.186)
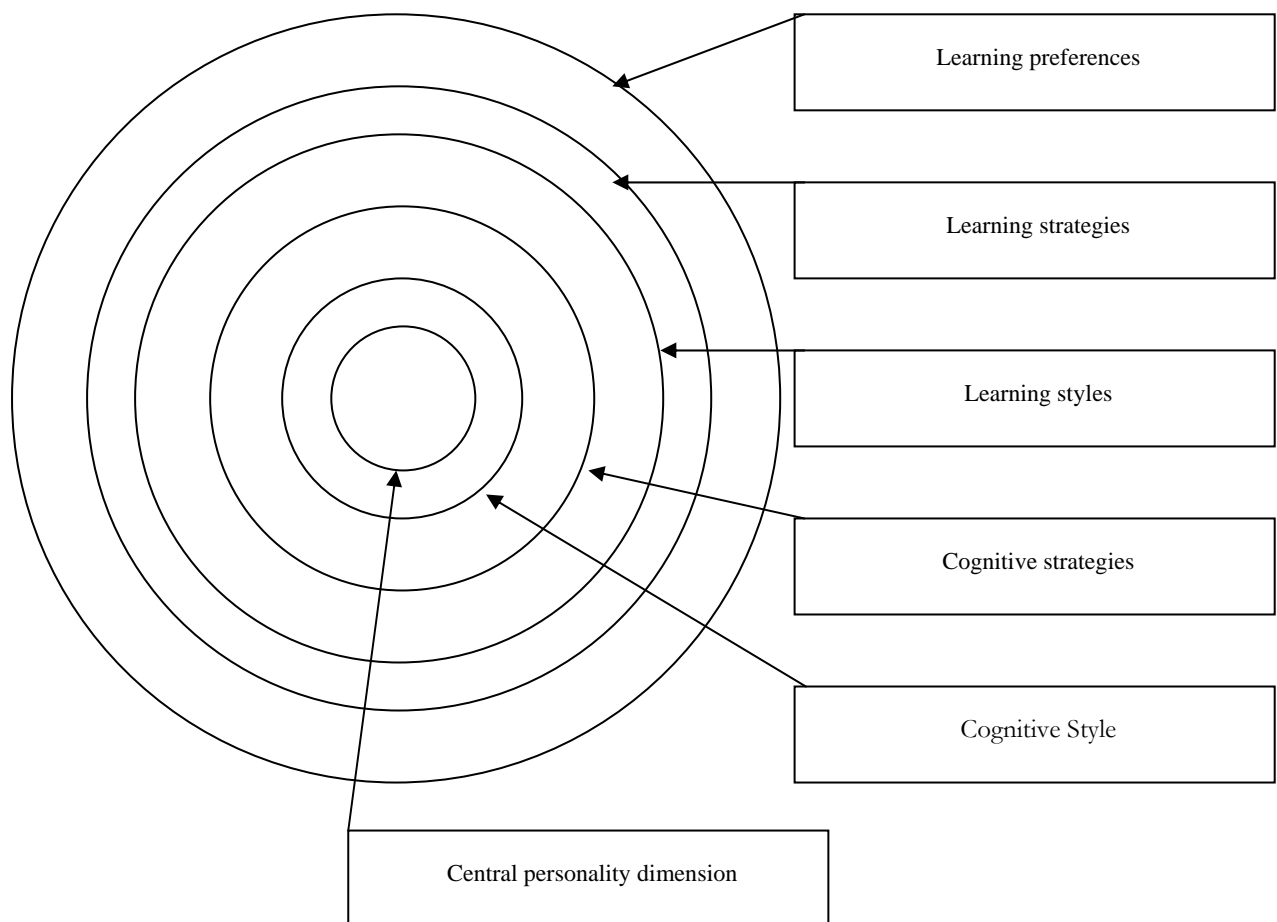
Summary

The confusion surrounding the terms associated with learning styles, preferences and strategies has been considerably clarified by both the Curry and the Sadler-Smith models. Both those models bring a distinctiveness to the various terms used to describe individual differences in learning characteristics, as well as providing a sense of the relationship between them. Finally, the models provide for an understanding of the relationship between the various concepts and the influence of personality and environmental factors.

Variables Related to Learning 'Style'

Investigations into the effects of different variables on learning style have used a wide variety of theoretical frameworks and instruments of data collection. In the review of research below the generalised term 'learning style' has been used, as suggested by Curry (1983), to describe the general field of interest and the collection of conceptualisations. Using that term avoids adopting a more clumsy set of terms to cover the various theoretical approaches and constructs that have been employed by the different researchers. Wherever possible, the orientation of each researcher towards styles, preferences, approaches to study etc., is identified as part of the discussion of the findings of that piece of research.

Research has indicated that several variables are clearly related to learning styles and preferences. For example, Tamir (1985), in a meta-analysis of fifty-four research publications on styles has shown that, among high school and college students, cognitive preferences and learning are related to cultural background, grade levels, discipline being studied, curriculum approach, career goals and achievements. Working with students at the Open University of the United Kingdom, Richardson, Morgan and Woodley (1999) have shown that the approaches to study of distance education students are related to gender, age, academic discipline and prior education. Verner and Davison (1982), in an investigation involving subjects of widely varying ages, showed that age is a factor in learning style; and Holland (1980) has shown that mature age students have less need for course and classroom structure than do younger students. Holland also showed that cultural background is related to learning style.

Cultural Background

Interest in the learning styles of specific cultural groups of students has been varied, with research studies being reported on a number of different groups. Considerable interest has been shown, for example, in learning style research by educators who have need to teach across different cultural groups. Claxton and Murrell (1987, p.v) suggest that as our society becomes more diversified in terms of cultural backgrounds, the most urgent area of research on learning styles is that involving cultural differences. There are stereotypes of Asian students in Australia, for example, which have typified Asian students as passive learners who seldom move outside the curriculum, and who see assessment as requiring the regurgitation of material learned in class.

Samuelowicz (1987), working at the University of Queensland, concluded from her research that many Asian students adopt a 'reproducing orientation' to study. This research was based on interviews with academic staff in the disciplines of Pharmacy, Computer Science, Education, Dentistry and Commerce. Other researchers have noted that Asian students typically have a reproducing orientation (eg Ballard and Clanchy, 1984, 1991; Bradley and Bradley, 1984; Gassin, 1982; and Noesjirwan, 1970). Biggs, however, on the basis of a series of research studies using the concept of 'approaches to studying' (Biggs 1990, 1991, 1992) came to a quite different conclusion from Samuelowicz. Biggs concluded that the evidence indicating that Asian students are 'rote learners' is 'mostly anecdotal' (Biggs, 1991, p27), and that there is

evidence to indicate that Asian students rely less on rote learning than do their Western counterparts.

One of the difficulties with much of the research on culture quoted above is that it does not discriminate between cultures other than Asian and otherwise. Attempting to overcome this deficiency, Smith, Miller and Crassini (1998) narrowed their definition of Asian students to first year in Australia university students of Chinese origin, and for whom a Chinese dialect was the first language. They also restricted the sample to students of Finance or Computing, and tested them with the Entwistle and Ramsden (1983) ASI. An important outcome of the Smith, Miller and Crassini (1998) methodology was that the data represented a better defined group of Chinese learners than the previously pooled 'Asian students'; and their factor analysis revealed new insights into the learning behaviour of those students. Most particularly, the factor analysis revealed a different set of factors for Australian students than for the Chinese students, indicating that the differences between the two groups in their approaches to studying are differences in the kind of approaches used, rather than differences in the degree to which the same approaches are deployed. Smith (2001) has more recently shown that there are also significant differences between Chinese students from different nations, indicating that culture and environment interact to result in different approaches to study.

In a further study using the Smith, Miller and Crassini (1998) data, Smith and Smith (1999) analysed the ASI results on a scale by scale basis, and drew important conclusions aimed at informing instructional design and methodology decisions. Smith and Smith (1999) concluded that Chinese students from Confucian Heritage Cultures were more likely than their Australian counterparts to expect high quality in instructional materials, a higher degree of structure within learning programs, and to expect considerable support mechanisms to be put in place. Baron (1998), also working with Chinese students from Confucian Heritage Cultures drew similar conclusions, particularly with regard to the support structures necessary to enable these students to participate in open-ended discussions.

Cultural differences in learning style have also been investigated by Yuen (1994) using Kolb's Learning Styles Inventory, in a study of managers in Singapore. Yuen found that Singapore managers were characterised by Abstract Conceptualisation and Reflective Observation, while United States managers were characterised by Concrete Experience and Active Experimentation. These results were then used in a very practical way to examine training options and decision making processes, resulting in management education that was designed to more effectively suit the typical styles shown by Singaporean learners. Hispanic and Asian students were shown by Hansen (1995), using Witkin's Embedded Figures Test (1971), to be more field-dependent than Caucasian students. Similar findings with Hispanic students have been reported by Castaneda, Ramirez and Herold (1972) and Ramirez and Price-Williams (1974).

Gender

Gender differences in learning preferences of Education students were shown by Heikkinen, Pettigrew and Zakrajsek (1985). Using the CLSI they showed that males prefer content including numeric and inanimate concepts, while females preferred qualitative content, and content involving people. Males also preferred competitive learning situations, and instructors who are authoritative, while females preferred a learning context that was well organized and had clear guidance for students. Females, the research showed, tended also to be more visual learners than males.

Gender differences in learning preferences were also reported in a research review by Brainard and Ommen (1977). In summary, that review indicated that females have a greater preference for the qualitative and people-oriented disciplines, while males showed a greater preference for numeric and inanimate content in learning. Females required greater levels of course organisation and direction, while males preferred greater independence in learning.

Gender differences investigated in the Smith and Lindner (1986) study, using the CLSI, showed males as more competitive than females. That finding was not shown by Brainard and Ommen (1977) working with college-level students in the US; nor by Smith (2001) in his study with technology students in TAFE, also using the CLSI. However, in his study with apprentices in Australia, Smith (2000b) did show gender differences in learning preferences to be present. The Smith (2000b) study, consistent with other research, showed males preferring numeric content and inanimate content, with females showing a preference for qualitative content and people oriented content. Females showed a preference for learning through reading, rather than through listening, watching or through direct experience. These findings are consistent with research by Halpern (1997), which showed higher performance among males for tasks involving spatial ability. At the same time, work by a number of researchers (Breland & Griswold, 1982; Maccoby & Jacklin, 1974; Murphy, 1982; Walding et al.,1994) has shown superior verbal ability among females.

Smith (2001a), in his factor analytic study of the learning preferences of VET technology students identified three major factors. The first factor was interpreted as a preference for textually presented learning material as opposed to material presented visually or as a series of direct experiences with techniques and equipment. A comparison of the factor scores of males and females showed a significant difference between the genders, with females having higher preference than males for textually presented material. A second factor was interpreted as a preference for learning collaboratively with other students or the instructor, as opposed to being dependent upon the instructor for structure, guidance and encouragement. No difference between the genders was shown by the factor scores calculated on that factor. A third factor was interpreted as self-directed learning where students scoring highly on that factor were characterised by a preference to study independently, and to set their own learning goals. Again, no gender related difference was revealed by a comparison of factor scores.

Finally, in their research comparing the approaches to studying of Chinese and Australian students, Smith and Smith (1999) identified a gender difference only in the Achievement Motivation subscale of Entwistle and Ramsden's (1983) ASI. Richardson, Morgan and Woodley (1999), in their review of gender research based on the ASI have commented that gender differences tend to be shown only on the affective subscales, rather than on the cognitive subscales. For example, males show typically higher scores on achievement motivation and extrinsic motivation, while females show typically higher scores on the fear of failure subscale. In their own study of distance education university students, Richardson, Morgan and Woodley (1999) showed that the factor scores for the reproducing orientation were higher among females than among males. There was also a gender by discipline interaction for extrinsic motivation, with men obtaining higher scores than women. Although Smith and Smith (1999) did not find that interaction for Australian students on the extrinsic motivation scale, it is noteworthy that the gender interaction for the intrinsic motivation scale showed females scoring higher than males.

Age

Results from studies by Holland (1980) and Verner and Davison (1982) have shown age to be a variable related to learning style. Both those researchers have shown that more mature students have less need for course and classroom structure than do younger students. Resulting in somewhat different findings, Smith and Lindner (1986) also investigated age as a variable in learning style preferences. Their results showed that older VET students preferred a well-organised program; they were more competitive; they were interested in the detail of content; they preferred an authoritative instructor. Additionally, older students preferred numeric content more than did younger students, but they also preferred qualitative content more than younger students. The older students also had higher preferences for learning by listening or by reading.

A study by Calder *et al.* (1995) with vocational learners indicated that younger learners were more resistant to change towards taking responsibility for their own learning than were older vocational learners. That result would appear to lend at least partial support for the findings of Holland (1980) and Verner and Davidson (1982), and possible support to the Smith and Lindner (1986) finding that older students preferred learning through reading. However, there was evidence in the Smith and Lindner findings that older students may be less inclined to take responsibility for their own learning in that they showed a preference for authoritative instructors, and for listening.

Findings from other research focussed on the relationship between age and success in independent study are also quite mixed. Working at the Open University in the United Kingdom, Woodley and McIntosh (1979) concluded from a study of 18 to 30 year-olds that the older students were more equipped for independent study. They suggested that was most likely due to older students having more stable lifestyles into which study could be better organised. Woodley (1981) and Eaton (1980) have shown, however, that subject discipline may interact with age, in that younger students performed better than older students in Science studies at the UKOU. Providing some consistency to the mix of results using age as a variable, Richardson, Morgan and Woodley (1999) and Harper and Kember (1986) have shown similar results from research using Entwistle and Ramsden's (1983) ASI. Both studies showed older students achieving higher scores than younger students on the meaning orientation factor. Additionally, Harper and Kember (1986) showed older students to be more intrinsically motivated, and Richardson, Morgan and Woodley (1999) showed them to be less extrinsically motivated.

In a study with Australian VET teachers who were completing a bachelor's degree or a diploma, Pithers (2001) showed that younger VET teachers (less than 35 years of age) were significantly more field-independent than their older counterparts, indicating that the younger participants in the research were more reliant on an internal frame of reference, and that they were able to develop structure to deal with ambiguous or uncertain situations.

Program of Study

Canfield (1980) showed that, at college level, there are significant learning preference differences between program groups. Education and criminal justice students had a high preference for a well-organised course with clear expectations; business and data processing students were characterised by a low interest in content pertaining to people. Data processing students also showed a preference for content which includes detail and numeric concepts; and art history students showed preference for material involving inanimate objects, for delivery that included strong affiliation with the instructor, and for a visual presentation of learning material. Also using the CLSI, Alsagoff (1985) showed differences between program groups at the Universiti Sains Malaysia. Her results indicated that Humanities and Social Science students preferred peer affiliation more than Science students; that science students had a higher preference for working with inanimate objects than did Social Science students, but the latter had a higher preference for content relating to people. Science students also had higher preferences for learning through direct experience, while Social Science and humanities students had higher preferences for learning by listening or watching.

Smith and Lindner (1986) worked with particular program groups of technical education students. In their research they used students from a number of TAFE programs: Child Care; Office and Secretarial Studies; Business Studies; Electronics; Foundation Year Art; and Apprentices. Students were tested using the CLSI. The data showed that each group of students had a distinctive set of learning preferences, and these preferences tended to be those that might be expected from each group. For example, Child Care students had preferences for working with qualitative information, and with people; while Electronics students, for example, showed a preference for inanimate objects and direct experience as a mode of

learning. Similarly, Reading-Brown and Hayden (1989) have shown differences to exist between the learning styles of students in liberal arts courses and those in courses of technical training. Using Kolb's Learning Styles Inventory (1976), Reading-Brown and Hayden (1989) showed that technical education students were more characterised by passive observation and reflection than were liberal arts students, who adopted a more active-experimental approach. In a meta-analysis of fifty-four published articles on research into cognitive preferences, Tamir (1985) has shown that engineering students are more likely to adopt a passive style that accepts the content and structure of a program as provided by the instructor. Also working with vocational students, Smith (2000a) has shown differences in the learning preferences of technology and business students, and apprentices. In this latter study, program groupings were not defined any more closely than those three broad areas.

Holland (1980) has suggested that the field dependence-field independence (Witkin *et al.* 1977) dimension is important. Field dependent learners, for example, are more skilled at learning and remembering material with a social content (eg humanities, social science), and that field independent learners have greater success in subjects such as mathematics and science. Westman (1993), using Schmeck's (1983) Deep and Elaborative Processing Scales, and the California Psychological Inventory (Gough, 1975), showed that learning styles may be content specific, and vary with learning tasks. Investigating approaches to study differences through Entwistle and Ramsden's (1983) ASI*, Richardson, Morgan and Woodley (1999) have shown academic discipline differences among distance education university students. Students undertaking a general mix of subjects showed relatively high scores on the reproducing orientation, while technology students showed lower scores. Arts students showed low scores on operation learning.   Arts and science students obtained low scores on extrinsic motivation, as opposed to education students with comparatively high scores.

Summary

Several variables have been shown in research to have an influence on styles and preferences of individual learners. Those variables include culture, gender, age, and the influence of particular programs of learning and the demands they place on learners. Although research results are fairly consistent in identifying the way in which style is influenced by each of these variable, there is some distance to go in identifying how those influences actually cause variations between individuals in their styles and preferences.

Developing 'styles' in learners

As Laurillard (1993) has observed, a major deficiency with learning styles research has been that student characteristics are explored '…as though they are independent of the context of particular learning tasks' (p.32). Hartley (1998, p.57) lent support to this view when he criticised the mechanistic and quantitative approaches to research on learning styles and strategies, and advocates supplementation of those techniques with qualitative data drawn from case studies and interviews. Similar impatience with purely quantitative and questionnaire-based research was expressed by Marland, Patching and Putt (1992b, p.3) in their criticism of the 'process-product' approach to research on student learning. Marland, Patching and Putt (1992a, 1992b) advocated a more qualitative approach based on interviews and recall by students of learning events. More recently Veenman, Prins and Verheij (2003) have also pointed to discrepancies between the learning styles assessments that are made through at least one quantitatively based learning style inventory and an assessment of styles that can be made qualitatively through data derived from students thinking aloud while learning.

Laurillard (1993) has some very useful, simple, and powerful observations to make. She points to the value of the factor analytic approach in affording insights to learner types and learning

dimensions, but she rejects some of the conclusions reached. Laurillard rejects, for example, the notion that an individual can be classified as a 'deep approach' learner, or an 'achievement oriented' learner, as though that appellation applies to any learner in all learning situations. Laurillard observes that it is easy to think of others as always adopting the same learning approach all the time, but almost impossible to think of oneself in that way. She broadens the considerations surrounding research on learning styles and processes when she argues strongly for an approach to understanding learning that includes consideration of the parts that context and content play in a learner's approach to learning; to the learning preferences that learners exhibit; and to the variety in learning styles that may be displayed by the same learner.

As discussed earlier, Curry's (1983) 'onion rings' model provides a useful framework in considering the influence of instructional and other environmental factors on learning 'style'. To reiterate, Curry has suggested that learning preferences, the outermost 'onion ring', represent the layer that interacts most with learning environments, learner expectations, instructor expectations and other environmental factors. Curry suggests, therefore, that learning preferences are the least stable feature of the learning style of an individual, and the most amenable to development and change. The second most outer layer of the onion model Curry sees as the information processing style, and is conceived by Curry as the typical approach of an individual to processing information. She suggests that because this layer does not interact directly with the environment it is a good deal more stable than preferences, but is still amenable to development through learning strategies. The innermost layer of Curry's three onion rings is the cognitive personality style which, she suggests, is an underlying and relatively permanent personality dimension.

Both Curry (1983) and Biggs (1994) have identified that a personal styles approach and an information processing approach are two among a number of approaches to learning styles research. The personal styles approach, according to Biggs (1994, p.318) takes the view that cognitive style and learning style are stable individual traits that transcend the contexts or content of learning (see also Riding & Cheema, 1991; Riding, 1997). Biggs (1992) suggests that approaches to learning, however, are a function of several interacting influences, including learner characteristics, conceptions of learning, and learning contexts and experiences of learning (see also Biggs, 1993). The information processing approach focuses on the ways in which learners deploy cognitive and metacognitive strategies (eg. Schmeck, Ribich & Ramanaiah, 1977; Mareno and DiVesta, 1991). This approach also takes the view that learners can be trained to make efficient use of cognitive and metacognitive information processing strategies (eg. Weinstein & Mayer, 1986). More recently, Riding and Sadler-Smith (1992) and Sadler-Smith and Riding (1999) have investigated the relationship between cognitive style and instructional preference and have begun to draw together these two approaches identified by Biggs (1994). An interesting aspect of the Riding and Sadler-Smith (1997) work has been their suggestions for adjustment to instructional design and delivery processes to compensate for cognitive styles that are not well-suited to particular instructional contexts and methods. Among the suggestions made by Riding and Sadler-Smith (1997) is the possibility of using the strengths of one cognitive style to enhance the usage of features of another style. In a similar way, Gibbons (1994) has provided a number of techniques to assist instructors to develop self-directed learning among learners who are dependent on instructor guidance and program structure. Successful implementation of those strategies, as suggested by Gibbons (1994), would appear to enable a learner to broaden available learning strategies from those typically field-dependent to include strategies more characteristic of field-independence. Kember (1995) has taken a similar view in his model of learner development from the more instructor-controlled pedagogy to the more self-directed andragogy.

In their review of cognitive style, Sternberg and Grigorenko (1997) have observed that everyone possesses every style to some degree, and that people will use different styles in different learning situations. The notion that individuals will use different styles in different

situations has also been proposed by Kolb (1976), and Laurillard (1993). Sternberg and Grigorenko (1997) make the point:

> We suspect that none of the past theorists have ever viewed styles as purely idiographic and discrete. In other words, the theorists do not argue that everyone has wholly different styles and that either people have a style or they don't (Sternberg & Grigorenko, 1997, p.707).

Sternberg and Grigorenko go on to argue that styles can be developed and learned, and that they are at least partially developed socially through observation of role models. Consistent with Curry's (1983) suggestion, Sternberg and Grigorenko (1997) suggest that cognitive style can be influenced and developed. Coker (1995) was able to show this effect of learning context and content in her study with athletes. Using the Kolb Learning Styles Inventory, Coker had athletes respond to the inventory with their focus on classroom learning, and separately she had the same group respond to the same inventory in a context of learning about their sport. Her results showed considerable differences in response on the thinking and feeling modalities of the inventory, leading her to the conclusion that learning styles shifts occur dependent on whether the learning task to hand is cognitive or motor. More importantly, Coker suggests that the value of learning styles data as a predictor is influenced by the learning content and context, and that these need to be clarified to the learner prior to responding to a questionnaire. Westman (1993) has undertaken similar comparative research using both Schmeck's (1983) Deep and Elaborative Processing scales, and the California Psychological Inventory (Gough, 1975). Her results indicate differences between students on the basis of whether their focus at the time was towards English and foreign languages, or towards learning mathematics. Westman concluded that learning styles are content specific and probably influenced by content areas studied, and provided some warning comments on the Geiger and Pinto (1991) findings that student learning styles do not change significantly as they proceed through three years of college education. Westman's (1993) findings, and warning, are supported through work by Hansen (1995) who has shown that, among post-secondary technology students, cognitive style and learning behaviours are influenced by the experiences of learning they have while progressing through their course. Richardson, Morgan and Woodley (1999) have observed that, with approaches to studying, the research available has not provided a clear answer on whether change occurs as student proceed through an undergraduate course. At a preferences and learning behaviours level, there is evidence (Ramirez and Price-Williams, 1974) of an influence through experience both in the family setting and outside that setting. Ramirez and Price-Williams (1974) argue that children develop preferences and behaviours through observation and imitation. They further argue that adult preferences and behaviours are derived from this earlier learning.

An explicit assumption of the importance of content, context, and delivery was made by Canfield (1980) in the construction of the CLSI. The CLSI manual (p.1) quotes Travers' (1973) review of research on teaching that

> …the results strongly supported the existence of learning styles, an attribute of the individual which interacts with instructional circumstances in such a way as to produce differential learning achievement as a function of those circumstances (Travers, 1973, cited in Canfield, 1980, p.1).

Summary

There is evidence that the characteristics of learners in the way that they typically go about learning can be influenced and developed. Relating that to the Curry and Sadler-Smith models, it is tempting to suggest that as the style feature approaches the outermost rings of those models, then the more it can be influenced and developed. That is consistent with the view that outermost rings are more susceptible to environmental influence, such that learning preferences are more amenable to development than, say, cognitive style. While there is

considerable evidence to support that suggestion, it is by no means unequivocally true. However, as a strategy for practical application, there is probably a greater likelihood that it is preferences that can be developed in a learner to enable engagement with learning media and experiences that might otherwise be somewhat inaccessible to the learner.

The utility of a knowledge of 'style'

Different views on the value of learning styles and preferences in instruction are expressed in the literature. Bostrom, Olfmann, and Sein (1990) argue strongly for a framework of information systems training based in learning styles, and they advocate the development of a number of different 'mental mapping' processes to achieve enhanced training outcomes. Ruble and Stout (1993) refute those claims vigorously, referring to them as 'an unwarranted leap of faith', and stating that '..the conclusion that learning styles are important factors in end-user training is unsupported at the present time.' (Ruble & Stout, 1993, p115). Bostrom and Sein (1993) responded equally vigorously to the Ruble and Stout remarks, expressing the contrary view, but also lamenting the deficiencies in Kolb's Learning Styles Inventory, which had formed part of Ruble and Stout's criticisms.

Misko (1994a, 1994b) is one of a few writers who have directed their attention to the relevance of learning styles to VET students. In her review she draws attention to research by Harris, Tetrick and Tiegs (1993), showing that high ability students do better than low ability students on interesting tasks, but worse on boring tasks. She also notes findings by Salomon (1981) that indicate that high ability students are hindered by too much explanation, while low ability students depend on it. Misko (1994a, 1994b) advocates that VET instructors need to be sensitive to these styles and contexts of learning to achieve effective instructional outcomes. In their review of open and flexible delivery for industry training, McCollum and Calder (1995) also conclude that learning preferences and learning styles influence the effectiveness with which individual learners learn from flexible delivery of training. The NCVER (1997d) in Australia has similarly suggested that an understanding of learning styles is important to effective training provision in VET, and has made this a focus for the government coordinated VET research strategy in the period 1997 to 2000.

Sadler-Smith's (1996) 'non-adaptive' model suggests that the most practical response to matching teaching and learning styles is not to try to cater for each individual, but to provide a range of instructional options that learners can choose from. The typical learning styles of the target group of learners provide crucial information here in developing a relevant and client-focussed range of instructional options. Similarly, Ediger (1996) has proposed that it is important in achieving excellence in vocational education for learning materials to be packaged in a number of alternative ways so that the learner can select from the packages in a manner that maximises congruence with their own objectives and learning styles. Barry (1996) also advocates sensitivity towards learning styles of vocational education students in the application of flexible delivery. She notes, for example, that independent learning resources can be very effective for confident and competent learners, but less effective for students who are neither confident nor competent. She also notes that younger students have greater difficulty than do mature students with resource-based learning. Relevant here also are the findings of Wallace (1993), that students who prefer to work independently of instructors and other students achieve higher academic grades. Earlier writers such as MacNeil (1980) and Canino and Cicchelli (1988) had hypothesised that learning achievement for field-independents would be highest when matched with learning activities that required only minimal guidance from the instructor. Hayes and Allinson (1996) were able to identify seven studies where matching of learning styles of students with teaching methods had been tested learning outcomes being the dependent variable. Their review of these studies showed that four of the seven showed clear and positive effects, and that the other three studies provided results that were related to field dependence-independence. In those latter three studies matching was shown to be beneficial

for field-independent students, but that mis-matching was valuable to field-dependent students. Hayes and Allinson hypothesise that this may be due to field-dependent students required considerable attention from their instructor, and that this attention was most forthcoming in a mismatched situation.

Additionally, there is ample evidence in the literature that the context and the content of learning are associated with the likely success of learning outcomes. These contexts include the form of media used, the nature of material provided to the learner, the expectations placed on the learner, the motivation of the learner, and the supportiveness of the enterprise towards the training being undertaken. For example, writing from a university teaching perspective, Laurillard (1997, p.175) makes the point that 'large classes and more so-called "independent learning"' address only input to the students, and not the interaction with the teacher'. She reports three case studies where multimedia techniques have been used to provide independent learning materials to students needing to learn theoretical constructs and their affordances. Her research shows the value to achievement of learning outcomes of introducing multimedia in a form which allows student interrogation, problem solving, hypothesis testing, and for students to use the program in a way that allows some freedom of choice. Her argument here is that the selection of media and the nature of the material provided to support that form of flexible delivery are crucial design components, based on a needs analysis. Carrying out their research in the food preparation workplaces, Fox and Roberts (1993) have shown substantial differences in learning styles, particularly between male and female workers. They have also shown that workers with different learning styles require the use of different media of presentation and different learning support structures if common learning outcomes are to be achieved.

Sadler-Smith's (1996) argument that there is a need to cater for learning preferences in teaching is supported by evidence from a number of studies. Kennington et al., (1996), working with managers in Poland, explored learning preferences using Honey and Mumford's (1986) preferred learning styles approach. Results indicated that Polish managers had a contemplative approach to learning, and that approach to management training was a recommended and successful one for imparting skills of management for a group of managers working in an economy in transition such as Poland's. In a much more sophisticated study than that of Kennington et al., (1996), Vermunt (1995) investigated the importance of process-oriented instruction on learning and thinking strategies. Defining process-oriented instruction as instruction that integrates the teaching of thinking strategies with content, Vermunt tested learning styles and provided students with an independent learning guide supported by tutorials. The findings are important to any discussion of learning styles, since Vermunt was able to show that instructor's knowledge of student learning styles, together with student's knowledge of their own styles, was a powerful activator for the presentation by tutors of individually tailored instructional technique, and student reflection on their own learning.

Dunn et al. (1995) conducted a meta-analysis of results across forty-two experimental studies designed to determine the value of teaching students through their own learning style preferences. Using quantitative methods to compare across the different studies, Dunn et al. concluded that matching student learning style preferences with instructional method is clearly advantageous to academic achievement. The combined evidence from the meta-analysis conducted by Dunn et al. showed that students whose learning styles were accommodated in teaching methodologies were typified by learning achievements seventy five percent of a standard deviation higher than students whose styles were not accommodated. Similarly, working with nursing students, Lenehan et al. (1994) showed that a group of students provided with learning opportunities based on their identified learning style preferences achieved statistically significantly higher grades than did a control group of students provided with homogeneous instructional methodology.

In an interview with Rita Dunn, Shaughnessy (1998) identified that a four year U.S. Department of Education investigation concluded that accommodation of learning styles in teaching was one of only a few strategies that had a positive effect on the achievement of

special education students throughout the nation. Shaughnessy also reports that an underachieving school in North Carolina brought its school achievement up to the 83rd percentile on the California Achievement Tests after three years of the implementation of a policy to match teaching methodologies to student learning styles. In the interview with Shaughnessy, Dunn suggested that it is important to teach students to recognise and use their personal learning style strengths, and that it is important for schools to provide the options in method and learning materials to enable students to operationalise their learning style strengths.

The extensive review of the field by Hayes and Allinson (1997) leads them to the conclusion that the matching of learning styles to teaching method in the workplace positively influences learning outcome; and that learning style can be influenced by educational experience. However, they also argue that some learning styles appear to be more suited to workplace learning and the performance of certain duties than other styles. Hayes and Allinson caution though, that there is much more research required to provide data on the matching of learning styles to workplace learning since the majority of research and theory on learning styles and preferences has been generated in schools and higher education institutions.

In reviewing the literature supporting the view that attention to learning style preference enhances learning, it is clear that some writers merely assume that to be the case or, in some reports, seem more to hope that it is. For example, Guy and Densonguy (1995) exhort trainers to pay careful attention to trainee learning styles prior to developing or delivering training programs, but they provide no evidence to support their recommendation. While there is plenty of evidence for their position, and Guy and Densonguy's audience was largely training practitioners, they nevertheless display an enthusiasm for the benefits of catering to individual learning styles and preferences that is beyond the benefits claimed in the research literature. Also writing for personnel and training practitioners, Stuart (1992) expresses the same enthusiasm for a knowledge of the learner and, most particularly, for the proposition that assumptions about learners based on a stereotype are unhelpful in the development of effective training. Stuart's article is an insightful one and, although she provides no research data to support her views, she comprehensively reviews a number of training practices and comments on their effectiveness in terms of the needs of different learner groups in industry and commerce.

McGregor and Quam (1996) examined not whether catering for individual style preferences was beneficial but, instead, whether or not medical students employed their own preferred style when given instructional choice. The students in the sample were not given advice of their preferred learning styles. The results provided no evidence that students did choose a learning format most congruent with their preferred learning style. That finding adds considerable importance to Vermunt's (1995) observation that a student's knowledge of his or her own learning style was a factor in enhancing learning outcomes. Similarly, White (1997) has shown that experienced distance education students place high importance on metacognition (knowing how one learns best) in accounting for their success as distance learners. Flippo and Terrell (1984) compared the learning performance of students who were given insights into their learning style using Hill and Nunnery's (1973) cognitive mapping process, with students for whom that insight was not provided. Students given the learning styles information reported more positive attitudes towards skill development, and indicated that the knowledge of their own style increased their confidence as learners. Pithers (2002) has made a similar observation when he wrote:

> Teachers and their students need to be taught to adopt a flexible approach to cognitive style attitudes, thinking and behaviour. All individuals in education and training need to be able to develop self-awareness about themselves in terms of any preferred cognitive style characteristics…, but then be able to select the information processing approach…which best suits the new problem or situation (Pithers, 2002: 129)

Summary

A knowledge of learning style among instructors is as important recognition of individual differences among learners, and serves as a warning that 'one size doesn't fit all'. The research is fairly consistent in its findings that an understanding by learners of their own style is important, since it allows for informed choice on the sorts of learning resources to access and the sorts of learning experiences and contexts to pursue. In a era of increasing choice for learners in the media of instruction and the ways that they can access learning, these choices are more important and need a basis for their resolution.

Should we match instruction to learning styles?

Although there is substantial evidence for the proposition that matching teaching methods with learning style preferences will facilitate learning, there is also a view (eg Cleverly 1994; Gregorc, 1979) that this sort of matching ultimately disadvantages the learner. This opinion derives from a sense that learning styles can contain learning deficiencies in that a student who cannot easily cope with a variety of teaching methods and information exposition is disadvantaged and, in a sense, disabled. Clearly, strongly skewed cognitive styles and learning style preferences do disadvantage the learner who is locked out of some learning situations and opportunities. Gregorc (1979) advocates that learners need to be confronted with a variety of preferred and non-preferred learning situations so that they become better equipped to make effective use of those different situations. Cleverly (1994) echoes this 'remedial' approach and suggests students become better equipped learners through exposure to a variety of teaching methods.

It is difficult to argue against that 'remedial' approach in a learning environment such as a school or an educational institution where part of the mission is to assist students to learn to learn, and to become better learners. In an industrial setting, though, where the enterprise is primarily interested in the work performance resulting from the learning, where there is a desire to contain training costs, and where there is an interest in the return on the training investment, it is unlikely that strong interest in the remedial approach will prevail. In that industrial context, where maximum efficiency of training is required, a desire to match teaching method to learning style preference is strong, provided the teaching methods can be effected within budgets and cost constraints. However, Gregorc's (1979) further view that learning situations should not always be constructed to suit narrow learning styles and preferences since it will lead to boredom and 'sameness' of experience has considerable value in an industrial training context. Indeed, Messick (1984) has argued that it is possible for an individual to employ a number of learning strategies, and to learn to shift to different and less preferred strategies where those are more effective for the learning of a given task. Doktor (1978) and Doktor and Bloom (1977) have provided workplace data indicating that preferred styles can be adapted and shifted when individuals are confronted by a learning task requiring a different, and non-preferred approach to be adopted and learned. At that level of learning processes, Biggs, Kember and Leung (2001) have also noted that these are highly context-dependent and vary with learning task.

Levels of analysis and utility

For knowledge of learning styles to be useful for instructional design or delivery, there has to be some confidence that the observed styles are relatively stable. The work of Curry (1983), Kolb (1976) and Sadler-Smith (1996) would indicate that, at least where the learning tasks and contexts are relatively similar, there is a reasonable degree of reliability in the styles of any individual.

Smith (1999), however, was interested in reliability from a somewhat different perspective. His concern was whether or not the typical styles shown by a group of learners would be similar to

those of another similar group of learners undertaking the same learning sequence (or course) in much the same context. Accordingly, his study reports on the learning preference profiles for VET students in each of office and administrative studies, child care, electronics, plumbing, sheetmetal, electrical mechanics, and hairdressing. The research involved administering the *Canfield Learning Styles Inventory* to at least two groups of students from each of those programs, in at least two separate years. The comparisons between each of the groups tested in each program were remarkably similar, with only minor differences occurring between the separate year groups. That research result provided confidence also that instructional design decisions based on the learning preferences for a given program group could be expected to hold validity for similar groups of students in those same programs in subsequent years. That was an important research finding for the preparation of instructional materials and delivery methods expected to have currency over a period of time.

Although the establishment of stability in the data between like groups of learners is encouraging, it is difficult to make practical and meaningful training decisions that are tightly matched to the profiles of scores on the large number of subscales that are often tested in common learning styles inventories. In the case of the CLSI, as used by Smith (1999), there are sixteen subscales. The problem here is partly due to the practical difficulties of responding completely to a profile with so much detail and, at the same time, designing training that is focussed on enterprise and learner need and achievable within the constraints of the learning environment and context. To construct training to tightly match the profile of each individual is likely to be infeasible, as Sadler-Smith (1996) has suggested. Additionally, even if such close matching were to be feasible, it would do little to adapt and develop learner preferences to engage effectively with the broad set of learning tasks that are typical of workplaces.
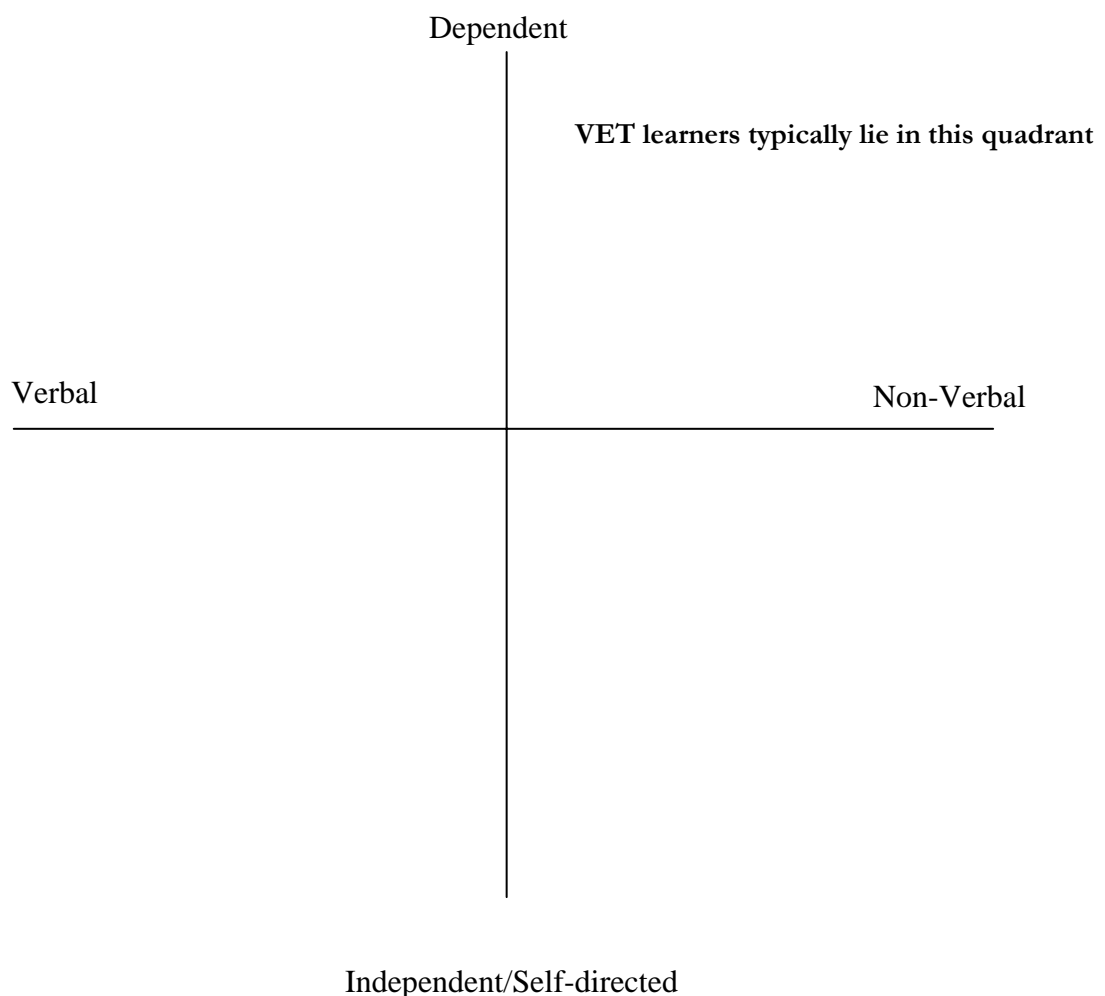
It also needs to be understood that each of the seven program profiles researched by Smith (1999) is based on mean scores and ignores within group variation. To match instructional design to the average profile of the group, ignoring individual differences within the group, would be to largely miss the point of any attempt to design training that is tightly matched to individual need. It is suggested (Smith, 2001b) that a higher order of preferences data, summarised to fewer dimensions, would provide a more practical framework for decision making. By working to a smaller set of more summarised dimensions of preference there is opportunity to design training to meet group preference characteristics in a looser way, but to also enable individuals to respond within that framework in such a way that they have opportunity for a certain amount of adaptation of the training delivery, and of their own responses to the content and delivery.

In a large scale factor analytic study of 1,252 vocational learners using the sixteen subscales of the CLSI, Smith (2000a) was able to establish two major underlying and orthogonal factors describing learner preferences. Factor 1 has been interpreted as describing a *Verbal–Nonverbal* preference for dimension where, at one end of that dimension, learners would have a preference for presentation modes that involve qualitative material presented through verbal forms such as reading or listening. At the other end of Factor 1 are learners whose preference is for learning from watching or directly using equipment, tools, or processes. Factor 2 has been interpreted as a *Self-directed–Dependent* preference where, at one end of the dimension, learners would be characterised by a preference for setting their own goals and working independently. The other end of the factor represents learners who display a preference for knowing the detail of the learning program, who prefer an instructor led delivery where the instructor provides considerable and directed guidance over the instructional sequence and the presentation of material. The sample in Smith's (2000a) study comprised vocational learners in apprenticeships, technology programs, business programs and health.

Inspection of the CLSI subscale scores contributing to the identified factors showed that vocational learners in Smith's (2000a) sample were typified by being dependent learners who prefer a clear structure for training, and a social training environment well supported by the instructor and other learners. On the second factor, vocational learners were characterised by a

preference for non-verbal presentation of learning tasks, involving hands-on, demonstration, observation, and practice. The two factors and the typical characteristics of this large sample of vocational learners are diagrammatically represented in Figure I. Although there was variation between individuals and between groups of learners in Smith's research, those variations were within a context of the preferences described above. These findings of a low preference among vocational learners for self-directed learning, and a strong preference for learning sequences presented through observation and hands-on practice are supported by similar findings in a large scale empirical study by Warner, Christie and Choy (1998). Other Australian research in an online learning context (Brennan, 2003) has similarly noted the importance of social contexts for learning among VET students, and the need for interactivity. The Brennan work also notes the need for clear structure and guidance within a learning program, and a need to reduce the reliance of VET learners on textually presented learning material.

Figure 4: Two dimensional representation of factors describing VET learner preferences (from Smith, 2001c, p.612).

Dependent

VET learners typically lie in this quadrant

Verbal   Non-Verbal

Independent/Self-directed

Summary

The research that attempts to investigate whether a match between learning style and teaching delivery methods is effective in enhancing learning is equivocal. Some research indicates a value in that matching, while other research has failed to show any increase in effectiveness. It is possible that these conflicting research results may be due to the level of analysis and specificity applied in identifying style and making a teaching response. It is arguable that disappointment will result in matching where high degrees of specificity are applied, such that many measures of individual style are measured and response attempted to each of those style characteristics. There is some evidence to suggest that a relatively simple style analysis of style on a limited number of style measures may form a better and more promising basis for successful matching.

Making effective training design decisions

It is suggested that preferences data at this higher level of analysis can be used to design training programs in a practical way. First, it is apparent that vocational learners are more comfortable in a structured learning environment where there is clear organisation of learning sequences and learning goals, and where there is support available from instructors and, where available, fellow learners. It is unlikely that these learners will flourish in an environment where they are required to be entirely independent and self-directed. Billett (1992, 1993, 1994) has argued, for example, that the development of transferable knowledge in the workplace is facilitated by socio-culturally rich and authentic learning experiences that are guided by expert mentors. The provision of local guidance from trainers, mentors, and other expert workers in the workplace are clear components of effective design for vocational training.

The need for learning programs to be well-structured has also been observed by Reading-Brown and Hayden (1989) and Tamir (1985), both of whom have shown that students enrolled in technically oriented programs of study are typified by adopting a learning approach that accepts and uses the structure and content provided by the instructor. Effective training design for these learners involves ensuring that learners are clear about their learning goals, and clear about the tasks they are expected to pursue in order to achieve them.

Additionally, in the design of training programs for vocational learners there is an apparent need to focus more on learning sequences that provide for construction of knowledge through observation, practice, and hands-on experience at the expense of learning through text or by listening to lectures. Clearly, where verbal presentation is unavoidable for the presentation of some learning material, it needs to be supported by the opportunity for hands-on experience, experimentation, observation or practice.

Apart from the development of training designs that loosely match the learner preferences for structure, social contexts for learning and support, and non-verbal presentations, it has been observed by several writers (Messick, 1984; Doktor, 1978; Sadler-Smith & Riding, 1999; Vermunt, 1995) that learners can be developed towards engaging in learning tasks and presentations that do not match their preferences or commonly used strategies. Developing learners to enable effective engagement with a broader set of training presentation designs is a goal worth pursuing by enterprises, since it broadens the choice of training available, thereby increasing the options available for delivery, and potentially lowering the costs of training design and delivery. Other writers have made the point that the complexity of modern workplace tasks and the rapidity with which they change demand the accessing of information from a wide range of sources (Berryman, 1993; Calder & McCollum, 1998). Training delivery that is more loosely matched to preference, in a variation on Sadler-Smith's (1996) 'non-

adaptive' learning system, provides opportunity for learners to engage in and develop non-preferred learning preferences and strategies.

Another very readable piece of relevant work here is *Fresh thinking about learning and learners* (ANTA, 2002), which comprises a number of challenging 'think pieces' designed to explore the notion of learners as knowledge builders. Consistent with the Sadler-Smith (1996) non-adaptive learning system is the notion explored in the ANTA (2002, p.37) work suggesting that learners need to be 'provided with more resources than they need so that they have to decide and choose for themselves'. The challenge here is developing in learners ways to make meaningful use of these resources and their content.

Self-Directed Learning – an important style consideration

We have chosen to develop a section of this literature review dedicated to the notion of self-directed learning as an important component of thinking about styles. The reasons we see this as important enough to warrant a separate section are several. First, in the two major studies of vocational student learning styles undertaken in Australia (Warner, Christie and Choy, 1998; Smith 2000a) self-directedness versus dependence in learning has been shown to be an extremely important factor. Second, training packages, as they are implemented in the workplace and through flexible delivery, demand a level of self-directedness among learners. Third, as our VET learning becomes more oriented towards online delivery, self-directedness in learning becomes increasingly important.

Morgan (1993) makes a useful distinction between different conceptualisations of 'self-directed' and 'independent learning' when he writes:

> In open learning and distance education there is one view that 'independent learning' means the separation of the teacher and the learner, such that students study in isolation. For other writers independent learning is concerned with students taking responsibility for what they learn and how they learn it, and developing greater autonomy and self direction in learning (Percy & Ramsden, 1980; Boud, 1981; Morgan, 1985) (Morgan, 1993, p.123).

Wright (1987) draws the same distinction in his discussion of independent learning between a 'capacity to think and operate without close direction' and the 'ability to take responsibility for one's own learning' (p. 121). He expresses a preference for the latter conceptualisation since, he suggests, it conveys more of a sense of learner control. Wright argues that adopting a personal development view of learning implies education should aim to:

✧ encourage students to take more responsibility for their own learning;

✧ enable students to bring their own experiences to new learning situations;

✧ relate learning to student needs; and,

✧ encourage a problem-centred orientation to learning.

Paul (1990) argues the case for the development of learner autonomy and independence on several grounds, including the need and trend for open learning to reach new clienteles and serve a broader cross-section of clients who may not be initially well equipped to be independent learners. Reeve, Gallacher and Mayes (1998) have similarly commented that, without skills of goal setting and structuring, the very openness of flexible learning provides a difficulty for learners. Paul (1990) also suggests that, in a changing knowledge society, it is increasingly important that learners construct new knowledge and reflect on and challenge what they learn.

The diversity of learners in terms of a preference for independent or dependent learning contexts is reflected throughout the literature. Sadler-Smith and Riding (1999) and Smith

(1999, 2000a, 2000b) have viewed the diversity as a continuum of independence-dependence, or self-direction–dependence, while other writers have suggested that learners belong to types. Shale (1982) has suggested that at least two kinds of student enrol at Athabasca University - those who are successful with independent modes of learning and those who are unprepared for it. Moore (1986) suggests three types of students - self directed learners, students who are self directed in the pursuit of credentials only, and those who have an emotional need for dependence

Boote's (1998) research with VET teachers in Australia has shown that there is concern that there is no mechanism for determining how self directed students are, and Boote has also concluded

> There appears to be an assumption that VET students either are already self-directed in
> their learning when they commence VET training or will gain the skills in self direction
> as an automatic outcome of VET training   (Boote, 1998, p.82).

Summary

An ability to be self-directed in learning, and to self-manage that learning, is becoming more important in an era of increased learner choice about the media they use for learning, and the contexts within which they learn. Self-management presupposes that some informed choice can be made about these engagements and that, as learning proceeds, the learner is able to monitor progress and adjust learning as required. There is plenty of evidence that the skills and attitudes required to become a successful self-directed learner can be learned.

Learning Strategies

Sadler-Smith (1996) defined a *learning strategy* as a plan of action adopted in the acquisition of knowledge, skills or attitudes through study or experience. We provide specific examples of learning strategies in Table 1 later in this section of the literature review.

Although there have been a number of theoretical frameworks for classifying the different identified learning strategies, there is reasonable agreement that there are three identifiable groups, or domains, of learning strategies. These domains are generally referred to as *metacognitive, cognitive* and *social/affective* strategies, as proposed in the classification of learning strategies developed by O'Malley and Chamot (1990, pp.44-45), and the similar taxonomy of learning strategies proposed by McInerney and McInerney (1998, p.79).

In their research into learning a second language, O'Malley and Chamot (1990, pp.44-45) defined the three domains as follows:

✧ *metacognitive* strategies, defined as higher order executive skills involving planning, monitoring or evaluating the success of a learning activity;

✧ *cognitive* strategies which are used to operate directly on information presented, and to organise and process it to effect learning; and,

✧ *social/affective* strategies that represent interactions with others or 'ideational control' over affect.

An identical classificatory system for learning strategies was developed a year earlier by Short and Weisberg-Benchell (1989) when they classified learning activities into cognitive, affective and metacognitive or regulatory activities. Vermunt's (1989, 1992) review of the literature developed a grouping of a wide range of learning activities under the same three identified activity headings. Although there is considerable agreement on the identification of metacognitive and cognitive strategies, Brown's (1987) comment that '..it is often difficult to distinguish between what is meta and what is cognitive' (p.66) is acknowledged here as a problem in the reliable classification of strategies.

Research by workers such as White (1997) and Boote (1998) has shown the importance of metacognitive strategies in the development of independent learning skills, while workplace research (eg Billett, 1996, 1998) has identified the importance of socially contextualised learning strategies. Other research (eg Weinstein & Mayer, 1986; Mareno & DiVesta 1991; Vermunt, 1989, 1992) has shown the importance of cognitive strategies in constructing knowledge.

Marland, Patching and Putt (1992a, 1992b) developed a very comprehensive set of learning strategies (although they called them 'mediating processes') in their research on distance education students at university level. However, comprehensive that it was, the strategies identified by Marland, Patching and Putt (1992a, 1992b) represented an incomplete set for analysis of VET environments since they were framed in a context of learning from reading and using learning materials that had been developed for university-level students studying at a distance. As result, strategies that involve learners appropriating knowledge from engagement in the practical activities of the workplace, as vocational students do, did not have a place in the Marland, Patching and Putt work.

Billett (1996, pp274-276) has drawn extensively from the literature to suggest a number of means of appropriation of knowledge in situated learning – an important inclusion in research with VET learners, where so much of their learning is developed in the workplace. Billett's analysis involved the identification from the cognitive literature of a number of means of knowledge appropriation that have been observed or proposed by previous researchers. Some of these are strategies used in the appropriation of knowledge from text or other learning resources, while others are appropriation mechanisms derived through engaging with the workplace environment. Means of appropriation resulting from engaging with the workplace environment, as identified by Billett (1996), provide a set of learning strategies that are useful in augmenting the Marland, Patching and Putt classification such that a more comprehensive set of strategies can be developed that are inclusive of experiential and workplace learning, as well as learning from structured materials designed for flexible learning.

Smith (2003), in his study of the learning strategies used by apprentices in constructing learning through flexible delivery, combined the Billett strategies with those of Marland, Patching and Putt to yield the more comprehensive set of strategies shown below in Table 1. The strategies have been grouped into sets of metacognitive, cognitive and social/affective learning strategies, following the O'Malley and Chamot (1990) classificatory headings. Table 1 shows that grouping, and provides a brief definition of each strategy.

Smith's (2003) research with apprentices showed that in their use of metacognitive, cognitive and social/affective strategies the apprentices in his sample made greatest use of those strategies that assisted them to construct knowledge as it was presented by the learning package, or by their instructors, trainers or supervisors. Little use was made of strategies that would indicate self-directed learning, working outside the structure provided, or learning independently of a socio-cultural and hands-on context comprising their peers and their instructors. These results were indirectly confirmatory of Boote's (1998) earlier conclusions that VET learners are not characterised by well-developed metacognitive skills.

Table 4: Learning strategies and brief definition (derived from Marland, Patching & Putt, 1992a, 1992b; and Billett, 1996)

Strategy	Definition
	Metacognitive
Analysis	reduces, breaks down whole (eg problem or task) into parts
Strategy Planning	plans ways for processing or handling textual material during training sessions
Cognitive monitoring*	thinks about, reflects on, evaluates or directs own thinking
Selection	identifies key material, gist material, or that which is relevant to assessment
Evaluation	makes judgements about the value of textual materials, activities, in-text questions, own position or point of view
Cognitive	
Recalling	brings back into working memory an idea, opinion or fact previously stored in long-term memory
Confirming	judges that ideas in text support own beliefs, practices, tactics
Generating	formulates own questions, examples, ideas, problems; interpolating; going beyond the data
Diagnosis	identifies strengths and weaknesses in ideas, strategies, points of view
Deliberation	engages in thinking about a topic, segment
Translation	expresses segments of text in own words
Categorising	sorts items, ideas, skills into different classes or groups
Imaging	creates a mental image of an idea in text to gain a fuller understanding of it
Application	considers the use of an idea or tactic in a different context
Linking	associates or brings together two or more ideas, topics, contexts, headings, personal experiences, materials, tasks
Rehearsal	repeats ideas, facts etc two or more times to facilitate recall
Anticipation	predicts or states expectations that problem, question, textual feature etc will be encountered; looks forward to new material; wonders about the possibility of an event or occurrence in text; relevance of material content
Comparing	identifies similarities or differences between two statements, concepts, models, situations, ideas, theories, points of view etc.
Trialling	Trialling in real workplace of knowledge gained from learning program
Experimentation	Trying out an idea on equipment or process to test own understanding
Problem solving	Finding a solution to a problem requiring relevant workplace knowledge
Practice	Engaging in practicing the tasks being learned
Social/Affective	
Worker observation	Unstructured observation of a fellow worker carrying out the task as part of everyday work
Demonstration	Structured observation of the process being demonstrated by a fellow worker
Peer discussion	Discussion with fellow worker to assist in knowledge development
Supervisor discussion	Discussion with trainer or supervisor to assist in knowledge development
Scheduled Class	Attendance at a formal training program to assist in knowledge development

* named 'metacognitive' by Marland, Patching and Putt (1992b).

Several writers (Weinstein & Mayer, 1986; Riding & Sadler-Smith, 1997; Smith, 2001a) have suggested that learners can be assisted to use learning strategies to counteract any difficulties they may have that are associated with learning styles and preferences. For example, a given

learner may be strongly visual and hands-on in style and not engage well with reading material that may be necessary to use. It is argued that this learner can be assisted to use strategies such as imaging, application and linking to help with moving from text to a preferred visual image and association with the practical task to be learned. In that way, instructors can assist learners to overcome non-preferred learning style characteristics through the use of learning strategies that build upon the individual's learning style strengths.

Summary

Essentially, it is the invocation of a number of different learning strategies that teachers and instructors use when they provide their students with a number of different ways, and different exercises, through which they can learn. The utilisation of a range of learning tasks that require the deployment of different strategies assists learners in the development of new learning strategies, and in the choice of strategies that may suit them and that may assist in compensating the engagement with learning tasks and learning presentations that are non-preferred.

Reaching some conclusions

This has been an extensive review of research and theory associated with learning styles and preferences. Although the field is a complex one, and characterised by a certain amount of confusion and conflicting research results, it is possible to draw a number of quite firm conclusions.

Level of analysis

First, the degree to which styles and preferences can be measured and profiled for any individual learner can be very specific, or it can be more general. Although the various learning styles and preferences tests available vary in the number of subscales they measure, it would seem that a specification for any one individual that is too detailed and specific may not provide for effective utility. One question here becomes what can an instructor, or an instructional designer do with such data. A second question relates to the degree of specificity available learning styles inventories can reliably measure anyway. An instructor can make use of a general understanding of the learning style of a learner, but what can be practically done is not commensurate with measuring a large number of learning style characteristics, such as the sixteen subscales that the Canfield Learning Styles Inventory measures.

Although the practical instructional use problem is large enough with individual students, it becomes very much magnified when we are dealing with groups. Within any learner group there will be as many profiles of learning style and preference as there are individuals in that group. To design learning to suit every one of those styles would be a futile and impossible task.

Two concepts that we have reviewed above help here. First, as Smith (2001b) proposed, learning style data at a more generalised level can be very useful, and there was also evidence presented that, although there are individual differences within any learner group, there are also likely to be some common characteristics that can be used with effect. He suggested that VET learner styles can be largely characterised along two related dimensions:

✧ Whether a learner is self directed or a dependent learner, including whether a learner likes to learn in the social company of other learners, or whether the preference is for learning alone;

✧ Whether a learner prefers to learn through verbal means such as listening or reading, or whether the preference is for hands-on learning through demonstrations and practice;

Smith was also able to show that at this level of analysis it is often possible to determine group characteristics, such that the instruction for a group can be developed around a knowledge of style at this analytical level.

Together with that observation, Sadler-Smith's (1996) notion of adaptive and non-adaptive instruction is useful. Sadler-Smith proposed that the 'adaptive' approach would require the instructor to tailor learning to the style of each individual. The 'non-adaptive' approach would involve the instructor developing the teaching at a group level of styles understanding, but ensuring that there are variations in the teaching to accommodate other expressions of style that are likely to be present within the group. In that way any individual learner can exercise some choice within the range provided by the instructor.

VET learning styles and preferences

The research reviewed above has indicated a number of learning styles models, and a variation in the complexity of those. However, there is a degree of convergence among a number of these models that enables us to make some useful and practical observations of VET styles.

Taking the work of Riding and Sadler-Smith (1999), Warner, Christie and Choy (1998) and Smith (2000a, 2001b) together, as discussed earlier it is possible to suggest that vocational learners' styles can be described by the level of self-directedness, and the level to which the learner is willing to engage in learning through verbal means, or through non-verbal means.

Inspection of the Figure 3 enables us to place any VET learner into the quadrant space on a basis of how self-directed or dependent the learner is, and how verbal or non-verbal he or she is. It is also possible to place general characteristics of a group of VET learners into that same space such that we can design our instruction around that location in the quadrant space.

Instructional strategies can be developed around an understanding of learning styles and preferences in any given learning context, by providing more or less guidance and structure to students, depending on their level of self-directedness or dependence; by providing greater social interaction during learning where the group style would indicate that is preferred; and more or less hands on learning tasks, depending on their level of preference for that or for more verbal forms of learning.

Stability and context

Learning preferences are predictable for groups of like vocational learners where the learning tasks and contexts are similar. In developing the review above we have been careful to point out that, in terms of Curry's (1983) onion model, and the later development of that work by Sadler-Smith (1996), different stabilities are suggested for cognitive styles, learning styles, and learning preferences. By concentrating our analysis of the learning styles of individuals and of groups to a more generalised level of specificity, we increase the stability of these styles and preferences quite considerably. Accordingly, there can be considerable confidence that the styles and preferences for the different groups of learners in any given program area are likely to be fairly reliable over time (Smith, 1999), particularly if they are identified, described, and acted upon at that more generalised level. Nevertheless, it is important to remember that learning context and task are important here, such that the same learner may show considerable variation across a number of contexts and tasks.

In practical terms, VET instructors do tend to work within a training environment where they can largely determine the tasks and contexts for learning, and where they can also decide when and how they will wish those to change. Within that largely instructor-decided environment, there can be reasonable reliability and stability expected of the styles and preferences of groups of learners over different learning events.

Variability and stereotyping

In developing the literature review we have also tried to keep in the foreground that there are large differences between people in terms of learning styles and preferences. Additionally, individual differences still exist within groups of learners who may have similar styles and preferences. Although there may be some similarities in style among the group in question, there will also be difference in style, as well as differences between people in all those other variables that people differ on. Similarities in learning style don't have much to do with similarity in ability or interest and, although there may be variables such as gender and culture that can be associated with styles, those associations are still within a context of individual differences.

This is an important concept to bear in mind. In identifying and responding to similarities in style, it is easy to slip then into a view that all people within that group are the same and, hence, we create a new stereotype. Stereotyping people and groups of people is a danger when thinking about styles. The Smith (2000a, 2000b) studies showed some typical styles and preferences among apprentices in their level of self-directedness, their preference for hands-on learning tasks, and their preference for learning in a socially constructed group. Although these findings are useful for developing instructional approaches, not all apprentices will conform to that model. Some will be highly self-directed; others will actually like learning from reading; and yet others will be happy learning by themselves.

The model is useful, but we need to bear in mind that it is a model and not a description of an entirely homogeneous group.

Utility of a knowledge of styles for teaching and learning

We have reviewed literature that, taken together, provides evidence of increased effectiveness of teaching if we can design our teaching to suit style, at least at that higher level of generalised style characteristics. The evidence shows effectiveness, and it has been argued that taking the analysis of style to too great a level of specificity may not be fruitful and, at best, will probably be disappointing. We have also pointed to the disadvantages of only catering in our teaching to identified style, since that would do little to assist a learner in developing learning strategies that enable them to engage with instruction or instructional materials that are not matched to their style. To challenge learners to learn outside their 'learning style comfort zone' is to assist them to become more adept learners in a wider range of situations.

The learning preferences of vocational learners appear to be described by a preference for close structure in the design of training, opportunity for instructor and fellow learner interaction and support during learning sequences, and for the presentation of learning material in non-verbal, hands-on ways. Within that loose framework, it is possible to design training to meet those learner characteristics while, at the same time, enabling individual learners space to engage in some different ways, and to develop towards a broader set of learning preferences and strategies.

Additionally, we have reviewed evidence that indicates that perhaps the greatest advantage for learners comes to them when they have an understanding of their own style, such that they can self-guide towards a selection of instructional methods or instructional materials that best suit them. The non-adaptive model proposed by Sadler-Smith (1996), which suggests that a where a variety of instructional approaches and materials are available to learners they will be able to select for themselves is likely to work best where learners have an understanding of their own style of learning in different learning contexts and with different learning tasks.

Development of student learning styles

The evidence we have reviewed here also indicates that learners can be helped towards developing their range of learning styles such that they can engage effectively with a broader range of instructional techniques and contexts. The suggestion is that effective broadening of learner styles can be achieved through the extension of existing styles to achieve that broadening. Where, for example, a learner has a strongly hands-on learning style, it is possible to develop learning through verbal means such as reading and listening by asking the student to verbalise the hands on experience, or to develop the hands-on skills further by reading about them, and then deploying the new knowledge in a further practical application.

Instructors can also assist the broadening of styles by developing, in consultation with the learner, learning objectives and processes that necessitate the use of the different styles to be developed.

Learning strategies as compensations for style

Learning strategies are the actions taken by a learner to acquire knowledge. The learner uses metacognitive strategies to plan, control, monitor and evaluate learning; cognitive strategies to organise information for processing, learning, and remembering; and social/affective strategies to derive knowledge through social and emotional environments. Learners work over a range of learning strategies that they know and feel comfortable with, but they can be encouraged and shown how to broaden the range of strategies that they employ. Instructors provide opportunity to learners to use this range of strategies to develop knowledge and understanding through a number of teaching processes, and can assist learners to overcome non-preferred learning style characteristics through the use of learning strategies that build upon learning style strengths.

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PART 3: CASE STUDIES

Peter Smith

Jennifer Dalton

John Henry

Case Study Reports – Introductory Overview

In this research we extensively interviewed thirteen experienced VET teachers who were identified as interested in student learning styles and preferences, and who took account of these in their teaching and, where possible, in their assessment methods. This Case Study Support Document shows each of the case studies, and provides some conclusions that can be drawn from the case studies.

The case studies indicated that few teachers who understand and use learning styles have any strong understanding or association with any established theory of style. What they do have is a set of teaching experiences that have developed in them a strong understanding of differences and commonalities among individual students they teach, and the groups that they teach. These differences and commonalities have interested them enough to accept them as one form of the broader sets of individual differences that they confront among their students, and that styles and preferences are a valid and legitimate expression of difference that can be taken into account with some reliability in designing and delivering instruction. The experience base of these teachers has given them confidence that such differences and commonalities can be a useful tool in teaching. It was evident in a number of the case studies that the teacher had adopted an understanding of learning styles that was similar to and established theory of style, but the teacher was not aware of the existence of that theory. The most outstanding example of that was a number of case study participants who had developed an approach very similar to that of Gardner's Multiple Intelligences theory, but had not in fact heard of Gardner or the theory. What these case studies indicate is that some very functional and effective approaches are taken to style by teachers in the absence of theoretical understandings, but nevertheless developed to quite high levels of sophistication.

Similarly, as part of the observation of style difference as a legitimate form of individual differences, comes an understanding that student who differ from the teacher's own preferred style are not poor learners, but just different learners. The evidence in the literature (eg Darling-Hammond, 2000; Sternberg, 1997) shows that effective teachers adjust teaching to meet diversities in style, while teachers who are not sensitive to style differences are more likely to think more favourably of, and overestimate the achievement of, students whose style matches their own. The teachers in our case studies had moved beyond that to an understanding that differences in style are to be expected, and can be catered towards. In a similar way Rosenfeld and Rosenfeld (2003) have argued that less effective teachers who do not acknowledge differences in individual learning styles are more likely to believe that student learning difficulties are the result of student weaknesses, such as not being capable or not being motivated. More effective teachers are more likely to adopt interventionist approaches based on a belief that success in learning represents an interaction between learner characteristics, the learning context and teacher behaviour. These were characteristics displayed by our case study teachers.

Case study teachers also reported that attention to style in their teaching had not just been a function of experienced observation of student differences and commonality, but were also a function of the confidence in their teaching that had been developed through experience. They were confident to make an assessment of style, and confident to try (or experiment) with a teaching strategy that their 'educated guess' led them to believe might work. They were also confident to be wrong about these trials, and to in turn try something else instead. What that confidence derived from was a set of techniques they had to make the style identifications necessary, and a repertoire of teaching strategies they could use to respond.

There was also evidence that teachers in the case studies extended student style and preference engagement into new learning experiences by leveraging off styles the student already had established. One case study teacher deliberately looked for the things individual students were good at and then used those good features to build beyond them to develop student comfort with other forms of delivery or resource. Again, although not familiar with style theory, the process used by that teacher has been identified in the literature as one that is powerful to use (eg. Riding & Sadler-Smith, 1997). Another access and participation teacher had used those observations of strength to develop confidence in the student by developing learning tasks that drew on the already-present strength.

In reading these case studies, pay some attention to the following:

✧ How the case study participants see learning styles as one form of individual differences among a number of differences they observe and take account of;

✧ How the participants go about identifying group and individual learning styles, sometimes by observing and reflecting on what students are just naturally doing; and sometimes the teachers have developed interventions that are specifically intended to give them more information and insight into individual and group learning style;

✧ Also pay some attention to how these case study participants respond to style differences. What do they actually do? What strategies have they developed to enable them to respond to style within the constraints of time and the learning contexts within which they and their students operate.

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Case Study 1 - Jan

Jan – Horticulture teacher in a regional TAFE institute

Jan teaches in Horticulture at a regional TAFE Institute. She came into TAFE 6 years ago from a background of having run a small nursery business for over ten years. She had no teaching experience at all, when she commenced at TAFE but completed the mandatory Certificate IV (or its precursor) within the first year of her teaching. Since then she has completed her degree in Horticulture and also completed a Graduate Diploma in Further Education and Training. She is currently taking part in an ANTA funded Flexible learning leaders program, which has enabled her to attend conferences and to visit other sites.

Her teaching load is made up of Certificate II students who attend for one day a week over thirty weeks, students studying Certificate IV in Landscape Design which is conducted one evening per week over 12 – 15 weeks and a number of external studies students who she may see only infrequently, after an initial course counselling session. In addition she travels to at least 3 distance education centres at least once a month to link up with apprentices and their workplaces.

Jan is able to discuss at some length her understanding of how her students learn and of how her delivery strategies change to accommodate them. She has discovered that her there is considerable differences in ways of learning between the different groups she works with. One group of mature age students, many of whom are passionate gardeners, enjoy a lecture style of presentation as part of the class. They are coming to the learning situation with substantial background practical knowledge and are looking for information that will build on their existing skills.

However another group of students, some of whom have a mild intellectual disability, others are long-term unemployed and most have had little experience in horticulture, require quite a different approach. Jan has noticed that having a class only one day a week, and on a Monday is a significant factor in planning for them/. They are generally very difficult to motivate first thing in the morning, and need to be out and doing immediately. She remarked, that if she was to attempt to begin with a theory class she would lose them in ten minutes. She has found that this group of students learn best by having the information presented to them, almost incidentally as they work on their horticulture projects, and that they also need a lot of reinforcement and repetition in order to learn. She would find with this group that as the day progressed she could introduce more formal delivery, as long as it was interspersed with periods of activity. The process she adopted was to get the students outside and practicing first then follow up with reflection and some theory afterwards. The students needed the practical activity in order to have something to reflect upon and talk about.

Jan recognises that the approach she has needed to take with the second group described above does not match her own learning style and so did not come naturally to her at first, however observing the 'glazed eyes' and general demeanour of the group, when she began as she usually did, soon persuaded her that she needed to take a different approach.

In addition to allowing the students to begin the day in an active way, Jan has found that they are also able to respond to her demonstrating and modelling what is required before actually letting them loose on the equipment and materials. She also allows them considerable flexibility in what they can choose to do. She has identified her regular Monday students as very visual and tactile in their learning styles and has noticed that because of the visual preference they are quite particular about the quality of the videos that they watch. Old video stock, identifiable by the fashions and

hairstyles of the presenters can be quite distracting for them. Jan found in surveying the students that they made little comment about the practical aspects of the class or her own up- front delivery, but were very critical of the videos. She now realises that the lesson would have been more effective without the distractions of the video and it took up quite a lot of time, trying to tease out the important messages of the video 'because of the presenter's safari suit!'

The students tactile learning modality was also strong and Jan explains how she worked with this:

> We had one particular unit about pests and diseases and instead of me giving the lecture that day they had a facilitated activity which was something I wanted to try. I hadn't tried that before. There were still worksheets to go through but they went out with jars and collected bugs they could find, brought them back in and started using them as their models and examples to work through these worksheets. So it is being able to touch and feel and I'd covered the slowness of the Monday morning they were already out grabbing stuff and bringing it back in. The slowness was gone once they had gone out of here with something to do.

Another aspect of learning style which Jan has identified that is almost universal with her students is their preference for working together with each other and many have commented that they enjoy then opportunity to be part of a group and not working in isolation. She sees this desire for being part of a learning community as a type of learning style, based around peer support. She also relates this preference to her experience of working with the external studies students many of whom do not complete their courses. She believes that if they are not in a position to learn with other students then they need greater support from the college in the form of pastoral services, than have been available to them. While Jan acknowledges that the preference for learning with others may be more prevalent among female students, she has evidence that male students also see that it benefits them. She referred to feedback from one particular male student who was travelling a considerable distance to be part of a class, rather than studying by distance learning. He felt that he mattered more as a learner when he was in a class and that being part of a class had helped his learning enormously. Jan believes that learning socially is a fundamental human trait and that while some people have to study by themselves because of work commitments or location , 'most people like to have a sense of community, to know that they are part of a group and that study is a socialising process and that the best way to learn is in that social environment'. However she also acknowledges that the need for a social learning environment may be mediated by students' lives such that students coming from a primary industries background may have a greater need to learn more socially.

There may be a certain tension between students preference for communal learning and their need to develop necessary electronic communication skills. While generally younger students, conduct more of their socialising electronically and are more comfortable and adept at communicating electronically, Jan is aware that horticulture students may not be 'particularly on-line savvy', and as a result their courses will need to incorporate those skills, if the students are to be effectively prepared for the workplaces of the future.   This strategy is also being extended to helping students to become more aware of their own learning strengths and preferences, with the intention that a broader range of options for study will be available to them to choose from. The emphasis will be on 'blended delivery' incorporating multi media , using library and video conferencing, workshops, self-paced workplace activity video conferences, practical work, and industry visits with expert talk. Through these means a range of learning styles can be accommodated.

Case Study 2 – Alison

Alison – Multimedia teacher in a regional TAFE institute

Alison teaches Certificate III, Diploma and Advanced Diploma in Multi-Media in a TAFE College in a large regional city. She has recently completed a Graduate Certificate and Diploma and in VET which was conducted within the Institute where she works. She has been teaching in TAFE for six years and in Multi-Media for four years and she also runs her own graphic design business.

Alison was interested in learning styles having studied aspects of it in her VET course and had found that it helped her to better understand and cater to the different needs of her students. She realised that she is predominantly a visual learner and communicator herself and she explains this to her students adding that when they are explaining things to her she may ask them to draw what they meant when she first started teaching, before she had learned about her own learning style, she initially expected her students to learn in much the same way she did, but now has a more sophisticated understanding of her students and their learning. She explains how her delivery has changed as a result of her experience, including her growing awareness of her students' preferred ways of learning:

> I used to do it all notes based. I'd hand out notes and talk about them and generally
> students would be bored silly most of the time, but now it is a lot more practical. I do it a
> lot more visually as well. I probably don't do a lot of talking.

 She has identified that the students who study the Diploma of Multi-Media fall into 2 distinct groups– 'the programming type of people' who know the ins and outs of the computer how to put it together and 'the visual people' who are good at designing but who are not necessarily technically competent. She describes the first group, the programmers, as being, without exception, not visual in their way of learning, seeming to lack awareness of , and interest in, the graphic design elements of the course such as colour theory and composition. These programmers, or technicians are more likely to be male and to prefer working individually rather than in groups and are keen to 'get to the bone of how things are put together'. They are 'experimenters' who want to go beyond what is taught in class in order to fully understand the programme they are learning about. They will tend to go on the Internet and find the latest versions of the programs and will look for patches to do extra things or add-ons to the programme. The programmers are interested in the programme and how the programme works and 'the extra bells and whistles you can get with it'.

By contrast, the other group of students who are generally a more even mix of males and females , she describes as 'more visually attuned'. They have what she refers to as 'the eye', or 'the knack', and are more comfortable working together in groups or teams. This group are most interested in what they can do with the program, rather than what the program does, or what add-ons they can get to the program.

Having recognised that there are significant differences in the interests and learning styles within her classes, Alison has realised that while she might have to deliver similar content to the two groups it will need to be done in very different ways. The visual students want what is being taught, presented to them 'up on the screen, whereas the programmers just want to do it – ' they just want to play and find out for themselves'. Once the introductory lesson in which Alison explains and talks through the new material is completed as a class, students then work through tutorials at their own pace, progressing to the stage later in the course where they are expected to

begin working collaboratively on projects. Alison has observed that the 'programmers will almost always choose to work with their own 'types', but she modifies this tendency by drawing their attention to the strengths and weaknesses within the group and encouraging them to select a balanced team of people to work with. She has noticed that more mature students have a greater awareness and appreciation of this than the younger students.

Alison has incorporated her understanding of learning styles, gained through her own VET studies, into her teaching delivery. Apart from explaining her own preferences to students, she will pursue a deeper understanding of her students methods of processing information, especially if a student is struggling in her classes. She is able to find out useful information about their communication and information processing by asking them, for example, to explain directions from one building to another and observing whether they use their hands, whether they need to draw what they are saying or how they go about explaining. She might also ask students to tell her more about how they like to learn. While she acknowledges that with younger students in particular, a question such as, 'what is your preferred learning style?', would be unlikely to get a positive response, more specific directed questions such, as do prefer to listen to someone talk to you, or do you prefer to read or see a picture, will often produce information she can use to modify her own approach with that student. She also checks other things that may be impacting on the students' understanding such as whether they are having trouble reading her notes, do they have literacy difficulties, or are they not good at following step-by-step instructions.

While the programmer/designer differences are the most noticeable and stable among her students. Alison has also identified other factors which will impact on the way in which students will approach their learning and hence how she will structure her delivery. Age or maturity is a major factor which while it produces different responses between the young students straight from school and the older work experienced students, nevertheless the programmer/designer characteristics still apply. She also referred to the introvert and extrovert personalities and how these will be reflected in students' ways of learning. While she has observed that there may be some extroverted programmers and some introverted designers, generally they would be the exceptions to the rule.

The issue of communication skills is an important one in the Multi-media field and one which can create difficulties for most students, even though the 'designers' are more outgoing, more group oriented and more communicative, nevertheless, most students initially lack confidence when it comes to presenting their ideas to a larger group. Alison consciously build into her program a scaffolding of communication skills development which allows her 'introverts' (ie. programmers) to benefit from the modelling which the designers can provide within a small group and then gradually draw out the programmers to a point where they are able to move from the deault reaction of , "oh no, do I have to talk up front", to a point where they can make their own presentation. The development of communication skills in this field is vital because the real work in the industry is based on communication with clients.

Through her recognition of the two clearly differentiated groups within her program, Alison has been able to modify her delivery to take advantage of those differences for the benefit of all of her students.

Case Study 3 - Freda

Freda – Corporate trainer in a private RTO

Freda has been a corporate trainer for a number of years and has recently moved into a managerial role that requires her to maintain a strong interest in staff training, and in the training that her staff provide to volunteers who work in her new organization.

In her corporate training role she saw the application of learning styles to suit groups and individuals as being crucial to her success as a trainer, and to gaining repeat business through providing a quality service. She likes to adopt the Honey and Mumford theoretical approach to thinking about learning styles, but she doesn't use the Honey and Mumford questionnaire to assess individual and group style. Instead she uses a combination of experience and group observation to ask herself questions such as:

> How are we going to deliver this course? How do these people typically learn? What would they want from me in delivery?

Using a combination of the Honey and Mumford learning styles theory and a DISC analysis, Freda develops a picture of the learning clientele and then develops her training delivery to suit those observed patterns. Part of that process includes discussing her observations and delivery ideas with the group to allow some form of ownership oin the learning experiences she will provide. DISC Dimensions of Behavior may not be known to all readers of this case study, but the analysis seeks to locate a person in terms on Dominance, Influence, Steadiness and Conscientiousness. Freda assesses individual learning approaches as she goes along by

> pulling information in from everywhere I can find it to help me to understand each person in the group. I thin go from that observation of the collection of individuals to modify my mental picture of the group characteristics.

Freda's approach here is to make her training decisions on the basis of the group data, but then looks at individual styles as 'exceptions' to the group. The set of exceptions then forms the diversity within which she works. Those diversities can be very powerfully used within the group in Freda's view. For example, in any one group she may have pragmatists style learners and theorist style learners. For the pragmatists she would provide an activity first and them run reflective sessions to review the activity in terms of 'what went wrong and how could it be better'. For theorists she would allow the opportunity for them to read the material first, discuss it in pairs, analyse it through a whiteboard and have them explain the theory behind the material to be learned. Using these different approaches within the same group provides opportunity for participants to see other styles in operation and to develop and adjust their own style of learning. Her major strategy in training is to use a person's primary learning style to introduce the topic, but to add value by introducing those non-preferred styles of learning for subsequent activity. She has observed here students discovering learning styles they didn't realise they had, and believes there is major value in learners understanding their own style since that teaches them how to engage with learning, but also to recognise other ways of learning that they don't typically use.

In Freda's view learners do vary their style to some degree with the context and the learning environment, and they try new ways of learning because they want to and, sometimes, because they think they should adopt a particular style in a given situation. However, Freda also believes that when under pressure people tend to move towards their most preferred style.

She sees assessment and learning as completely integrated, but that learning doesn't stop with assessment. She challenges learners to extend their understanding and commitment to learning by observing

> You've met all the criteria, so how can we add further value to that? How will you use this knowledge if someone approaches you differently and wants something a bit different?

Freda also uses a variety of assessment techniques that suit different people, and makes the point that

> In a large organization there are many different levels and many different sorts of people. To provide fair and accurate assessment I have needed to use a range of paper-based assessment, demonstration and observation, group work, role plays and simulations, and verbal questioning and probing.

Finally, Freda also saw a role for the concept of learning styles in the marketing strategies she needs to develop in her new organization. She is developing a set of marketing strategies based on VAKPOINT (visual, auditory, kinaesthetic, print-oriented, interactive styles) to appeal to different groups in the community.

Case Study 4 - Greg

Greg – Engineering teacher in a city TAFE institute

Greg is a young and enthusiastic teacher in the engineering/vehicle maintenance section of a city TAFE Institute. He has been teaching for around four years and is currently completing a university based teaching qualification. His own studies have made him more aware of the needs of his students, not so much because of what he is learning but because of the different way of learning which he is experiencing. Greg finds that much of the reading he is expected to do is long winded and over written in unnecessarily complex forms of expression. He likes things to be concise and straight to the point and consequently is very conscious of the need to rephrase things for his students so that they make sense. He describes what happens when something is explained to him in a 'roundabout way' that makes little sense, 'I can go bang and nail it in about three sentences'.

Perhaps as a result of his own study experiences Greg seems to have developed a particularly acute radar for detecting when his students need to have things explained to them in a different way. He understands that while there are common learning patterns among the students studying in engineering/vehicle maintenance, there are also subtle and not so subtle differences between them that will require him to take a different approach in order to get through to each student. He watches them closely and intervenes when he notices that a students has not 'got it'. Because the students are working on self paced materials most of the time, his interaction is generally on an individual or small group basis. He will explain, and if necessary continually rephrase that explanation until he gets the 'aha' response from the student.

In addition to his verbal interaction with the students Greg has also noticed that many of the written materials that they are using do not suit the way his students take in information. Just like himself, they want the information delivered in short sharp, concise and logically ordered form. As a result he finds himself needing to rewrite many of the student manuals, translating paragraphs into dot points. He regards this not as not so much a literacy problem as a style of information processing – students are not interested in wading through discursive writing, they prefer the information to be delivered in a straightforward, step, by step way that they can easily follow and which will enable them to get on with what they are really interested in which is working on machinery. He explains it as, 'the way people are wired and the way they think'.

Because Greg's students are predominantly apprentices, he may only see them infrequently, on block release, so does not have a sustained period of time in which to get to know them. His observations of the students and the ways in which they learn have helped him to develop and customise his own teaching style to better meet their needs. These generalisations are not set in concrete but are a guide to the kinds of learning styles he might expect to find within the group. Almost without exception the learners in this field are practical, hands on students who want to learn by doing. They are generally keen to take things apart as soon as they can, but Greg has to temper this enthusiasm initially in order to give them some underpinning theoretical knowledge. Students work in a self paced way using manuals and the computer, either individually or in small groups. Greg will call them all together from time to time to explain and demonstrate particular aspects of the course. Most students respond well to a 'show and tell' type of approach.

Drawing on some of his own studies and a recently completed Myers-Briggs work shop, Greg explains a key difference between the learners in his groups in terms of introverts and extroverts. The extrovert learner is more likely to be self directed, to quickly pick up on what is expected and

can 'run with it', with very little input from the instructor. They are confident learners, the ones who seem to do well with a minimum of effort and who only need limited instructor support. He associated this 'style' more with country students who, as a result of a more practical, often farming based upbringing, are generally more independent, more focussed, and less distractable.

He characterises as 'introvert' those students who are more likely to struggle with what is required but who are often unwilling to ask for help. As a teacher he has to keep a closer watch on these students in order to know when they need help and be able to give it in a way that makes sense to them. These are the students who would struggle without instructor support. They are usually the students who have had little opportunity for practical experience – they may be pre-vocational students or those whose apprenticeship or traineeship is in a very limited operation.

Greg also realises that some of these characteristics are a result of the 'maturity factor' and that the more mature students are more likely to have the experiences they need to draw on and are more prepared to acknowledge when they need a hand with what they are learning. He is also well aware that not all students come to the learning environment with similar levels of motivation to learn and that this must be taken into account when working with them.

While Greg may not talk about student learning styles in the language of the theorists he clearly has a great appreciation of what works for his students and he has the interest and enthusiasm to keep looking for ways in which he can make his trade area more interesting and comprehensible for them. He is prepared to take on further education studies himself, even though he acknowledges that books are far from his own preferred way of learning. He understands and works with the principles of adult learning and also appreciates the importance of making the learning environment as multi-sensory as possible.

Case Study 5 – Brenda

Brenda – Teacher, Hair and Beauty in a regional TAFE institute

Brenda teaches in the Hair and Beauty department of a regional TAFE college and has an extensive industry network within the regional centre. Her students range from young women not long out of school, to mature age students who are upgrading their qualifications or seeking a career change.

Brenda is adamant that any instructor 'worth their pay' should be able to identify the learning preferences of their students, and to be able to work with a range of learning styles and preferences. Nevertheless as this is a practical area of learning, most students have a preference for hands on learning and much of the instruction and practice caters for this. Assessment in this industry area is ongoing and students must be able to demonstrate competence over a range of different situations in order to successfully complete a unit.

It was particularly interesting discussing students' learning with Brenda because of the range of different students the staff in the department engage with, all requiring somewhat different approaches. These differences are not necessarily 'learning styles', but may simply be patterns of learning to which the students have become accustomed. The pre-vocational students who have generally come straight from school are used to being taught in a fairly lock-step, spoon fed way and it takes the instructors quite a lot of time to break them out of this expectation and to develop more independence in their learning. The high school VET students who are currently students for one day a week are even more entrenched in the expectation that they can sit back and they will be 'spoon fed'. With the apprentices the biggest job is to develop their problem solving and time management skills on the other hand, the beauty students who are mainly self employed, are highly focused and motivated with high and exacting expectations of the department staff. The differences between these groups of students are a form of learning style, and it certainly impacts on the teachers and the way they deliver their courses. For example, Brenda explained,

> The ones who come from work are very business like. .. they have quite a business like expectation of what they expect from their lecturer and are more assertivand they articulate what they want from the lecturers. On the other hand some more mature students who have not studied for a while have a lot of self-doubt about what they are able to do, and they need encouragement. The more mature students have much higher expectations about themselves and are less likely to be able to handle the failing of an assessment.

Brenda identified some interesting differences between the different groups particularly in relation to assessment. For example lack of success in an assessment task is likely to provoke the following reactions:

> The self-employed, confident assertive students will often question the result and the competence of the lecturer to allocate that result, while the younger students who will likely ask what they need to do to pass next time. The mature age students who have been along time out of a learning environment will often be devastated and lose confidence in their ability to ever pass anything.

For Brenda, the key student learning issue, is that of developing the students' willingness to be responsible for themselves and their own learning. Some students have very poor time management skills and may lack the motivation to keep up with the work. Brenda explains it in this way, ' It's not that they can't do it, it's just that they can't manage themselves enough to be able to do it. They don't understand that there is a time factor and there is a cut-off date and by the end of the year they need o have been able to completed the work.' Those who move from a pre-apprenticeship course to gaining an apprenticeship are generally those who know and understand that they are responsible for how much they get out of their training.

The actual learning styles also vary between the groups of students. those who are already in the industry are described as 'doers' who also learn well through visual demonstration. The order in which they learn something new is generally visual demonstration, followed by repeated practice until they have mastered the skill. The VET students may have a broader range of learning styles because they have yet to make a commitment to this very hands on industry. The content which is offered to the VET students is also less practical and hands on, with the emphasis being on communication skills interview techniques, resume writing, how to present themselves beautifully for interviews and job seeking. Many of those students do not continue with studies to be beauty therapists or hairdressers.

Brenda points out that a range of learning styles are being catered for in the delivery of the hair and beauty courses. The emphasis on flexible delivery means that students have access to lecturers, but also have computer based instruction programs and videos in addition to their learning guides and other written materials. They also have access to CD ROMS which are interactive and enable students to revisit any of the material they are not sure of. There is no doubt however that the practical tasks and the ongoing opportunities for practising and perfecting the manual skills are at the basis of effective learning in this area. As Brenda points out, many of the students would prefer to dispense with the theoretical components of the course, they just want to 'hit the hair', but this has to be managed, so that they are gaining the necessary theoretical components of the course without losing their interest and enthusiasm. Brenda is very confident that the sequencing of the course is effective and enables the student's knowledge and skill to develop in a systematic way.

Brenda is currently undertaking post graduate studies in education and relishes the opportunity to learn more about the skills and in fact the art of teaching and learning. She believes that effective teaching depends to a large extent on the personality of the teacher or lecturer. She says,

> I don't think lecturing is an easy job and it doesn't come naturally to a lot of people and we have a lot of people with excellent industry skills but they cannot get that knowledge skills and experience if they cannot transfer that to the students…I think it is a real inner thing to give that sort of knowledge and skills to other people. I think it's about your personality as well because you need to be really adaptable – you may have 16 different personalities in the one room and you need to be very open and accepting of them and give of yourself and some people don't have that.

Case Study 6 – Allan

Allan – Teacher in Automotive at a regional TAFE institute

Allan has been a teacher in the TAFE system for over 30 years and believes he has 'learnt a thing or two' about teaching in that time. He is currently teaching in the automotive department of a regional TAFE institute/college, offering certificates I- III in automotive. He has witnessed major changes in approaches to teaching and learning in the time that he has been teaching , some of which have been more positive than others.

One of the main differences between 'then' and now is the significantly increased emphasis on flexible delivery incorporating flexible enrolments. Students range in age from 16 to 65 and while predominantly male, do include female students in smaller numbers. Students (and their employers) can chose to attend 'school' as a traditional block release of two weeks at a time or may prefer to attend 1, 2, or 3 days a week over a longer period.

This increased flexibility means that it is now almost impossible to deliver a teacher centred lesson to a whole class because, as Allan pointed out, a class of 15 students is likely to be engaged in at least 13 different activities and stages of learning at the one time. The teacher centred lesson, when conducted by a knowledgeable teacher who was well prepared and well resourced, offered students a good introduction to many of the topics they needed to study. The teacher could introduce the topic or learning focus, draw on his own expertise and experience to make it relevant and follow up with a demonstration. However the downside, according to Allan was that only a couple of students would get a chance to get their hands on the equipment, most would be reduced to observers in the lesson.

In contrast, the approach which is now preferred is for every student to learn by taking a 'hands on' approach right from the start. For the majority of students this works very well. They are given a manual or workbook, given access to the particular piece of equipment to be studied and then allowed to pull the equipment apart and reassemble it themselves, learning as they go. There are still some aspects of the course which do not lend them selves to an immediate experiential learning approach, where a teacher introduction is required for health and safety or other reasons. Allan and his colleagues recognise that most students in the automotive environment learn best by being allowed to use a multi-sensory approach in which they not only watch and listen but can also touch, smell (and maybe even taste) what they are learning about. Students are now encouraged more to work things out for themselves, while it is the teachers role to direct, support and extend the students.

A reasonably common approach to a new topic has been for students to be given access to a range of materials, books, manuals, other printed matter, computer based programs, CDs and so on, and be required to 'do research' before tackling the hands on component. But Allan has observed the students can be 'busy' with research but at the end of three days still know very little. The flexibility is there, students can all be working at their own pace and on their own topics, but this does not necessarily translate into effective learning. The experiential multi-sensory approach is clearly recognised as a more effective form of learning.

Nevertheless, the written approach is still dominant in relation to assessment. Students can be offered alternative forms of assessment if it is clear that there is a discrepancy between their

written assessment and what they seem to be able to demonstrate and discuss. However they do not have a choice of assessment method themselves.

Students are assessed when they first come to the program in terms of literacy, numeracy and general mechanical aptitude and those with learning difficulties sufficient to create problems for them in the course are referred to the Institute's support unit for additional help. Like others in the automotive training area Allan is aware of a prevailing attitude, particularly among the parents of some young people, that students who may have struggled at school, will succeed in automotive, 'because he is good with his hands'. Drawing on his many years of experience Allan argues strongly that there are generalised learning abilities which are just as important in the automotive trade as in any other area of learning. So in that respect he would regard low levels of literacy and numeracy skills not only as indicators that students may have difficulty with the written and computational aspects of the course but also that they may have greater difficulty with other aspects of the course. After all, as he says,

> being good with your hands doesn't mean you don't need to use your brains as well.

For Allan there are a number of key elements which influence the ways in which students learn in his trade area and they do not necessarily fit into a 'learning styles' framework.

✧ Maturity is one such factor – older more mature students are more likely to want to be 'left alone to get on with it', whereas the younger less mature students need for more direction and intervention from the instructor.

✧ Motivation – this is often closely allied with maturity, and significantly influences the kinds of learning approaches that teachers take with their students. the motivated student will learn by almost any means, and will search and ask questions in order to learn

✧ Life circumstances – problems at home, economic problems and a range of other social issues, compounded by immaturity and motivation issues, make it difficult for people to learn. Allan cited the case of a third year student who has overcome a number of such difficulties and now openly acknowledges that what he is now learning is finally making sense to him. This is a clear indication that stress has an impact on students learning and that teachers may not be able to make much impact on that other than to be understanding and accommodating

✧ Gender – Allan recognises that he and his colleagues take a different approach in the way they work with female students – 'we're not as aggressive with them, we are more caring'.

Generally flexible learning when it is accompanied by the multi-sensory and experiential approach appears to work well for students in this field. Nevertheless there is still quite a lot of bookwork required of the students and this can create problems, especially for those with literacy and or numeracy problems.

However Allan takes strong exception to those who peddle the 'good-with-his hands, but' line. He is adamant that in his 30 years of teaching that no one can be good with their hands unless they can also think with their heads.

Case Study 7 – Terry

Terry – Teacher of Cartography in a city TAFE institute

Terry teaches Cartography and Spatial Information at a metropolitan institute of TAFE. His students range across Certificate IV, V and VI levels, with some of them being school leavers and others of mature age up to around 55 years of age. He assesses individual and group learning styles from observation of students as they work with him, and through his experience of teaching these groups over a number of years. Because of the 'mixed bag' of students in terms of age, and because some of them are very focussed on the course as professional development within their current job while others are not sure of what they want to do, he has to provide a considerable amount of flexibility.

Terry helps students to identify how they wish to learn by using a task orientation, where students select the task they wish to work on. That task may be selected by individual students for their own learning, or may be the selection of a group that wishes to work together. Terry assists the selection of task through talking to individuals, and helping them to connect their own needs with the learning outcomes being pursued in the course, and the required competencies.

Terry has devised a technique for identifying student progress in their learning, and their styles of learning, by having each student give feedback in each lesson on their experience with the previous lesson. By ensuring that each student speaks once before any students has a second opportunity to speak during these feedback sessions, Terry ensures that nobody dominates the discussion and that he therefore hears from each learner at least once during each class.

Students seem to prefer the task based learning over a lock step approach, and Terry observes that there is a wide variety among his students in that some want to learn through a hands-on approach, others through prepared written materials, some through library and internet sources and, of course, through a combination of these. There are also a number of students who prefer to learn from Terry teaching in a conventional classroom manner. Terry has developed an electronic repository of resources that students can access and use as they require.

Terry is conscious that there is a need for students to develop some different ways of learning from the ones they might always have used, and he accomplishes this through the project work so that

> students take different roles within a project group and that means that they need to engage with some different problems and some different ways of finding out things and learning from that.

Cooperative learning is also used by Terry by having students learning in pairs, and then each member of the pair is attached to another student to form a new pair that also learns together. Terry also notes that students will sometimes say they would like to learn in a different way to provide variety in their learning experiences within the course, so he challenges them to do things differently, or challenges by splitting up project groups so that students can work on different problems, in different ways and with different students. Through those techniques Terry is able to provide variety of learning experience as well as some development of different ways of seeing problem and of learning. He also observed that these techniques were not always successful and that from time to time students were not enthusiastic about these challenges. However, Terry also believes that student self-knowledge of their own style is important and, although he uses the

flexibility of student choice to assist students in identifying their own style, he finds this hard to achieve.

Terry's practice is to negotiate assessment with each students, and he provides for a range of techniques including peer assessment, group assessment, using a student assessment of another as part of that student's own assessment, observation of task completion, and oral assessment. He considers individual needs and styles have to be considered in assessment to ensure fairness and accuracy.

Case Study 8 – Robyn

Robyn – Adult literacy, and workplace training and assessing, regional TAFE institute

Robyn has been teaching for 10 years in TAFE, initially in student learning support/adult literacy and more recently in delivery of the Certificate IV in Workplace Training and Assessment, to predominantly industry based participants. As a former primary school teacher, Robyn has always understood the importance of recognising that people learn differently from one another and from the way in which she, as a teacher, might learn and teach. Her experiences and approach is particularly interesting because in addition to dealing with learning style issues within her own group of students, it is part of her role to help them become more aware in relation to the people they will be training in the future.

Robyn incorporates a range of approaches within her classes and endeavours to impress on the students, that they need to both understand their own ways of learning and those of the people they will be training and assessing. She includes real life experiences, practical tasks and a range of multi-sensory learning activities into her classes and bases her approach to teaching and learning very firmly upon adult learning principles.

For Robyn the key to developing training and assessment skills in her students is to emphasise the interrelationship between 'head, hands and heart' in all learning. For her, the emotional aspect of learning is fundamental as is the relationships that are established between all who are engaged in a learning process. In her Certificate IV classes she has, from time to time, had participants who lacked the ability to connect with their fellow students and these people have generally eventually recognised that they will not make effective teachers or trainers. On the other hand she cited the case of another trainee trainer, a truck driver who struggled with his literacy skills but who had the qualities required to be a great teacher or trainer, 'he just knew how to engage people. He had that gentle humour, he had passion and commitment and …he valued people.' In now working predominantly with people who are training to be trainers themselves, Robyn emphasises the importance of their ability to develop an intuitive awareness of the needs of the people they are training,

> I think one of the things I have learned is that you can teach people the mechanics of how
> to put together the session, how to deliver, but I think it is intuitive as to whether they
> have those people skills - I really don't think you can teach people those people skills or
> that passion.

She identified her own learning style as being visual and a 'doer' and she uses a generic learning styles quiz, picked up at a training session sometime which enables her to engage the students in a detailed discussion of such learning style differences as visual, auditory and kinaesthetic, individual and group, verbal and written. She has found that to be a very effective way to bring the concept of learning to the notice of her students. She has observed however, over the years, that for some students, no amount of explaining, or involvement, has been sufficient to enable them to move beyond a very didactic, authoritarian approach to training delivery. For those students the ability to connect with others and to understand other learners, has been lacking.

Robyn is aware of her own limitations in relation to technology based forms of delivery, something which she has found resonates with many of the adult students she has worked with. In a recent case students chose to drive to a country town half way between their two regional locations rather than submit themselves to, what for them, were the inadequacies of delivery via video conferencing. For both Robyn and the students in her class, the benefits of meeting together face to face, far outweighed the inconvenience of travelling to an evening class outside of their town.

Robyn has vigorously pursued her own learning mainly through personal reading rather than through formal courses and she has fairly recently become aware of Howard Gardners theory of multiple intelligences which she has found to be particularly relevant to the approach to teaching and learning which she has been progressively developing throughout her teaching career. While she recognises the need to cater to all of Gardner's intelligences, clearly she sees the development of the 'interpersonal' as being of particular importance for would-be industry trainers and assessors. It is an important aspect of Robyn's approach and one which she is modelling, both consciously and unconsciously, in her training.

While appreciating that her students have their preferred ways of learning, Robyn is also careful to ensure that they are exposed to a range of teaching and learning strategies, particularly as they themselves will be working with people who will learn differently from them. She says,

> I take the premise that as an adult we need to be challenged and taken out of our comfort zone and so it is good to actually experience a little bit of discomfort.

She encourages her students to reflect on what they have done in the classes and the activities they have been involved in and to identify the aspects they have enjoyed and not enjoyed in relation to what they have actually learned. They would often realise that

> although they may have actually hated doing it, they could still see that they were learning something.

These activities often included standard teaching strategies such as group work, role plays or giving presentations, all things which often stretched the comfort zones of many of the students. She particularly encourages them to take every opportunity to present to the group because that is a fundamental skill which they will need as trainers. She observed,

> you can see them squirm, absolutely squirm.

For Robyn, there is a basic flaw in the practice of people doing a Certificate IV in Workplace Training and Assessment on line, because the ability to engage with others is such an important component of being a trainer.

Case Study 9 – George

George – Teacher, Fitting and Machining in a regional TAFE institute

George teaches Fitting and Machining students at Certificate III level in a regional institute of TAFE. He has a strong interest in the way that his students learn and attempts to cater for their learning styles on a group basis as well as an individual basis. At a group level he observes that his students tend to be quite variable within each group that he teaches, but across all the groups that he teaches he sees considerable similarity. George's interest and understanding of learning styles has come through his decade of teaching and observation of students, rather than through an application of a learning styles theory.

Within the groups of students he teaches George observes that they are very much hands on and prefer to learn through observation, practice and discussion. He uses his previous accumulated experience to help to identify the styles of learning among the students he teaches by providing demonstrations within a group setting, but follows these demonstrations immediately with hands on practice sessions. These practice sessions allow him to work on a one-to-one basis with each students and it is through this interaction that he is able to gauge learning style. He provides within those practice opportunities for students 'to have some space and to find their own level and way of doing things'. Through the practice sessions and the discussion with students throughout those he is able to quickly assess how the individual student prefers to learn. He notes that:

> Although they all like to learn through practice, it is when they have difficulty or want to know more that I find out about their style. Some like to use books and other print resources from the library, and they are very self motivated and go and do this. Others need more guidance and I need to help them find and use other resources such as video and a bit of computer based learning material.

George also provides opportunity for students to work collaboratively on projects and in teams to allow for those who like learning through discussion and social interaction, but he also recognises some students like to learn by themselves with resources they get from the library, competency standards units provided by the Institute, technical journals, manufacturers guides and video materials. He does see that more mature aged students tend to be self motivated and self managed and they just want to come in and achieve the competencies as efficiently as possible but, at the same time, they want to pursue their learning to form an understanding of the concepts and underpinning knowledge. With younger students he observes more need for guidance and consistent encouragement. George made the point here that some younger students are not as interested in the learning since they are still uncertain that fitting and machining is what they want to do.

With all students George resolves the issue of selection of extra learning resources on a basis of content to be learned and the style of learning the student seems to prefer. With skills learning George finds that demonstration and one-to-one practice session work best, with time during the practice sessions for more general discussion among students on what they are learning. With more conceptual knowledge he observes that students prefer him to explain the concepts to the group, to use visual aids to the group, and to have other experts in the field come and speak. Throughout these sessions George sees opportunity for students to interact and to discuss as being very important. Also important in his teaching is a willingness to have students bring

problems from their workplace and provide these for whole group discussion, or for team work as a discussion or as a short project. Students also respond well to an opportunity to write up these workplace problems as a brief report where they integrate the issues in the workplace with the material they are learning in class, and discussing with their fellow students. A collective sharing of those experiences as a 'roundtable' also provides focussed socially based learning experiences.

George finds that using knowledge of student learning styles helps him to develop group instruction in a way that suits students, but that it also provides him with a framework in which he can reflect on and critique his own teaching and resources to seek improvement. He also feels much more proficient and professional about his own teaching if he is catering to student need, and seeking continuous improvement. Identifying the right sorts of resources for students with different styles adds to a sense of his satisfaction in his teaching, as well as seeing students respond well to the resources that they use. George also seeks to expand student learning preferences by challenging them to try different resources. As part of that challenge to expand their learning repertoires George also challenges students by asking them

> Well, how are you going to find that out? What will you get hold of to help you?

As well as providing students with an opportunity to identify their own preferred style, asking that question gives George the opportunity to assist the student in trying out some new ways of learning. With project based learning in particular the focus on outcome encourages students to look more broadly for useful resources. That increases their knowledge of available resources as well as their willingness to engage with them.

George has only limited capacity to take account of student learning style in final competency assessments, although he does use a combination of written, practical, visual and verbal means. During the process of learning, however, there are assessment opportunities provided for students to monitor their learning. In those assessments George is able to provide a range of assessment techniques such as those used in final assessments, but including some that are spoken only for students who need that.

Case Study 10 – Sally

Sally – Teacher, Access and Participation in a regional TAFE institute

Sally teaches Access and Participation students at basic through to entry level at a regional institute of TAFE. Although she has had some formal training with learning styles she felt this was rather minor and she has developed her own ways of identifying and responding to style. Because of the wide range of students she works with, many of whom have learning difficulties and problems with their confidence, she has found an understanding of style and a catering to it in her teaching to be crucial component of what she does. Sally doesn't work through any particular theoretical framework, but the way that she sees individual differences in style is very similar to Gardner's theory of multiple intelligences. Sally sees people have different talents (or intelligences), and that her job is to identify those, encourage students to recognise those talents themselves and feel good about them, and to use them as a platform for learning. She

> connects learners to learning through their style

Sally identifies those styles in individual learners through observation of the way that students work, what they say in conversation with her, and how they produce their work for her. She sees access students generally performing best through a visual and spatial approach to learning, and she develops concepts with them by providing learning activities that draw on those preferences. She talks about this identification of style by saying

> With these students I look for the 'key' – what is it that they are good at and like doing and that I can use. Sometimes I find a student who draws and paints well, and then my job is to have them recognise that skill and then we use it for learning. So I can get that student learning through the visual representations they feel comfortable with. I've also had students who learn well through singing, so I develop learning programs with them that involve them in singing, and they can take that away with them and learn at home or as they go about their daily business. I find these keys through interacting with them and by trying out things with them and seeing what works and what doesn't, and through being prepared to go where the student's style is.

Sally's teaching strategies for each individual are then based around the ongoing conclusions she makes as she works with and observes the student. She acknowledges that trying things out is often 'guesswork', but sees it as most important that students develop confidence in her that she is trying to help by trying things, and confidence in themselves to try. Acknowledging student concerns and addressing them with the student is important to her to ensure that students know their concerns are taken seriously and are attended to in terms of their engagement with learning. Sally made the important point here that

> You can't just assume that the student's goal is the same as the teacher's. Sometimes that is so but, for example, where the student has a very focussed employment goal everything that is taught to that student normally needs to be employment related. So I need to adjust my work with that student to try and get our goals working the same way, largely by me recognising that what I teach needs to connect with that desired employment outcome.

Sally makes use of group learning situations to assist in control of learning so that members of the group moderate, assist and learn from each other. This is important with younger students since they are also in the process of learning to learn through social interaction.

Sally provides a range of assessment methods to suit style, using written tasks, observation of task completion, model building, oral assessment, and pictorial representation. However, although she would like to negotiate assessment tasks with each individual she finds she simply hasn't time to do that, such that she needs to provide a package of different assessments and enable students to choose from the options available.

Case Study 11 – Kurt

Kurt - Teacher in Engineering at a city TAFE institute

Kurt is a very experienced instructor in an engineering based department of a multi-campus metropolitan TAFE College. Prior to taking up a teaching appointment over thirteen years ago, Kurt had extensive industry experience ranging from trade work through to management. He has also undertaken a range of further education courses and projects which have contributed to his knowledge and understanding of both teaching and learning and the constant changes within his field. He is currently very interested in working with flexible delivery and has been developing resources to support this.

Kurt identifies that much of his awareness of how students learn is now instinctive and has become an unconscious or automatic aspect of how he works with his students. His approach to teaching is based on the awareness that students want learning experiences that are

> realistic/ real life based, practical and relevant

The strategies and approaches that Kurt adopts in his classes are a reflection of his intrinsic understanding of how students prefer to learn. Even though he acknowledges that most of the students themselves would be hard pressed to describe their learning style, they generally do not like working from books and manuals. Units such as OH&S which are often delivered theoretically early in the course are ineffective if they are book based and boring. For Kurt, the key is to make the learning real for the students, if they are to really learn anything. For example students will carry out actual safety audits in the workplace as a way of connecting with the OH&S theory.

Having seen the way the students discard their workbooks into the 'circular file' as soon as they are 'marked off', Kurt realises that most students in this field attach little importance to books

> they are a means to an end, that's all.

In response Kurt searches for ways to make the material as interesting and relevant as possible. For example:

✧ **Demonstration** - students need to be able to SEE what the instructor is SAYING Kurt works from the basic premise that if he cannot find a way of effectively demonstrating what it is the students are expected to learn, then it is not worth them learning it.

✧ **Novelty** – this is important as a means of capturing student attention, but is also an aid to memory. Kurt constantly seeks novel ways of presenting the concepts to be learned, so that they make sense to the students. He monitors this through individual questioning as the students engage in practical tasks associated with the concept.

✧ **Real life relevance** - Kurt endeavours to get students out into real workplaces where they can see what is happening prior to discussion in class. He understands that students bring to the formal learning environment a range of experiences and that many may lack direct experience with particular aspects of what they are expected to learn. Clearly first hand knowledge makes the college based work, far more effective.

✧ **Realistic assessment processes -** students are able to do assessments verbally where Kurt can see they understand and can demonstrate that understanding. He does not insist on written answers if this is proving too difficult for a student.

Kurt has observed that some very competent students struggle to give clear logical verbal explanations or written answers even though they can demonstrate understanding. He appreciates that students may know without being able to verbalise that knowing and he endeavours to allow for that in the strategies he adopts particularly in relation to assessment. He will sometimes take students aside and talk to them to try to work out more about their learning style, if what is being done doesn't seem to be working for them. But he also acknowledges that just as important, or even more important than their learning style, are their motivations and other things happening in their lives at the time.

All of this needs to be taken into account when assisting students to learn.

His own interest in flexible learning and in developing resources for that has meant that Kurt has needed to become finely tuned to students' learning patterns. He has found that the students generally respond well to the computer based instruction packages that are available, provided they are well structured, clearly illustrated, and relate to machinery which the students can work on directly.

Although he has not studied Gardner's Theory of Multiple Intelligences his observations reflect an awareness of the different ways in which people learn and express that learning. In this case some students in this technical trade area may be able to demonstrate an intuitive/bodily understanding of what they have learned but have difficulty giving verbal or written expression to their understanding. In initially developing his understanding of how students learn Kurt acknowledges the influence of Bernice McCarthy's 4MAT system, which he learned about back in 1994. At the time of interview for this project he was planning to attend a series of workshops on Myer-Briggs Type Indicator, and was looking forward to that.

Case Study 12 - Mike

Mike – Teacher in Automotive Engineering at a city TAFE institute

Mike is an experienced teacher and coordinator of youth programs in a large automotive engineering Centre at a city TAFE institute. His career began as a mechanic in the UK before moving into dealerships. He took up teaching in automotive engineering through youth access programs in a college on the outskirts of a large industrial city in the UK. Since moving to Australia three years ago Mike has focused once again on getting young people into accredited training in automotive engineering through pre-apprenticeship courses that feed directly into apprenticeships. His Centre has increased its number of youth groups from two groups four years ago to around thirty in 2003.

For Mike, the issue of learning styles is bound up with the need to engage, or more correctly, to re-engage his young trainees in learning.

> The most common characteristic we see in a large number of students is that they really don't want school. They can't see the point of staying on at school and doing work that they can't see is going to be relevant in their life later.

Mike's emphasis is on having an 'open door' policy in operation in his Centre as he sees it important to give students a chance – "and for a lot of them it is their last chance".

> The way that we turn it around, I suppose we become their employer when they come on a pre-apprenticeship course. We try to build the life skills which will allow them access to a job and to keep that job. So we emphasize attendance and punctuality but we certainly try and provide an environment that is enjoyable to come to and engaging. I like to think that teachers go into the classroom with a sense of humour and it is an adult environment and the students are given choices. The most common comments of students about TAFE, and especially from my auto students, are that the teachers are different to school. They are on first name terms, they have a responsibility and input into they way in which they learn.

The teaching strategies used by Mike is not to identify particular learning styles but to teach with a variety of delivery approaches anticipating that through that variety he will be able accommodate the mixture of learning styles in the group. Essential to this approach to students' learning styles is the need to have teachers that are responsive to the students.

Mike and his teaching staff recognise that their students prefer practical learning tasks to theory.

> A student group will be made up of a mixture of students who like hands-on, who do not like lots of writing, don't like academic type of study. So rather than a single delivery approach we blend lessons with a mixture of theory and practical hands-on and try and use things such as CD's etc. to engage them and to get the theoretical background over to them. They don't like being sat down on their backsides for hours, so we get them involved and out there, and that is the way we have to approach things.

As students build their skills in the way they learn Mike shifts the learning tasks from more teacher-directed ones to those that require greater levels of student independence.

> So they've learnt those skills where they will take on a job and they have built up the confidence to do that.

Students are taught in teams but Mike emphasises the need to recognise that each student has their own identity as a learner. Even so, Mike is aware that the common features of his students are that they prefer to learn through a hands-on approach. This is most apparent at the start of their studies.

> They prefer a hands-on approach, they don't like lots of writing. They all particularly like the interaction with the teacher and the experience the teachers has got about vehicles. They like to relate their own experience and knowledge about cars which is something that they can use within everyday life I suppose.

But students broaden their approach to learning over the fourteen weeks of their pre-apprenticeship course.

> The students are very different at the end of it. And students who you thought at the start would never come in and read books or magazines towards the end will bring magazines and resources to use as part of their study and they will research things. By the time they get to the assignment stage they'll research it themselves whereas at the start we really had to build that as part of the lesson.

This transition is a deliberate strategy as Mike is aware of the demands if these students come back as apprentices.

> We'd also like to see the students come back as higher-level education students, diploma students in automotive and we need to build this type of progression into their education so they progress through. So that by the time they come back as an apprentice they have those skills to go away and research and then if they come back as a diploma student from an apprentice it is more self-directed learning.

While learning styles, as such, is not a topic of conversation between Mike and his teaching staff, the responsiveness of his Centre to the needs of young people taking a second chance at formal education and training ensures that the students' learning preferences are taken on board. This is done through the establishment of a teaching and learning culture focused on the outcome of "getting these students into an employable situation".

Case Study 13 – Helen

Helen – Teacher of Communications in a city TAFE institute

Helen teaches across a range of courses in Business Programs at a metropolitan institute of TAFE. This brings her into contact with a range of students at diploma and advanced diploma levels. Helen is aware of learning styles having done study in this area herself. But she admits that her awareness of learning styles, though enhanced through her study, tended to reinforce what she already thought about her students.

> My study lead me to add some extra activities and to structure things in a different way in some areas, but learning styles, as such, is probably not something that is at the forefront. I find that I teach a lot of different classes so it is really quite difficult to focus on students as individuals. I hate saying that because I think it is very important, but I hope that I do it by offering some variety in the way that I teach.

Helen has found that learning preferences tend to be associated with student maturity. From her experience, mature aged students use different ways of processing information, are far less visual and are more global in their style of thinking.

> The communications class that I have at the moment is a real mix. Some are straight out of VCE but the majority are mature-aged, some are from overseas or have an ESL background of some kind, and the learning styles are quite different. Delivery for that group is really quite difficult and so I use a mixture. I write my own materials for those types of groups because I like to have it in a fairly simple plain English style. I use a lot of group work because these types of students are very good at supporting the younger ones. I always use white boards and great detail. It really is a dialogue type of teaching and I would say we talk very much about the concepts and get students to express their ideas.

Helen is aware that she tends to classify the various groups of students she teaches and plans her teaching activities accordingly. For example, with her public relations students:

> I teach them every semester and I know those students well and they do have characteristics in common. They love to talk, they love to discuss and they get very excited about doing really practical activities. The more you can make it realistic the better it is for them. I teach it differently from other groups because I find it works very well if I give them an overview and then we go into examples and a model. We unpack the theory and they largely do it themselves. They work in groups and then they go away and do their assessment task. It works so well.

But with her other students, alternative approaches are required. With her international trade students, Helen finds that she has to teach in a more directed way.

> They like the fine detail and so much of the content is totally new. There is a lot of basic vocabulary so I do things with that group that I had not done with any other. I use Power Point quite a bit because it needs to be visual. Then they work through a web site that I've designed where they use a database to find information seeing how fast they can do it. Also on that website are multiple choice tasks that are testing their vocabulary and some of those students will use that over and over again. My public relations students would never do that.

Helen's marketing classes are predominately made up of young students straight from VCE. With these students, Helen has found that, although they had good language skills:

> their work had to be incredibly structured. Discussion does not work as well with them. They do not see teacher-led discussion as being meaningful and it is really hard to get them to contribute. I have to structure discussions very carefully with that group and they need a real variety of tasks. But the way to get them really focussed and working is to introduce assessment really early because they wanted to know what it was worth – the tasks are judged by how much they are worth.

Helen also teaches communications to accountancy students. Here she finds that these students are very focused and they expect to be busy.

> They really like to get their heads down and they will work very hard. I have to teach them that there are other ways of learning as well, especially in the communications area.

A key consideration for Helen is the maturity of her students. As her students progress through their tertiary studies she finds that they become more independent as learners and are more comfortable learning through a variety of approaches.

> Again I think that is a maturity thing. If I have got them in first semester I think they are very dependent. I think they really need to have great structure. By the time they get to their final stages they are like different students, and unfortunately I do not often see them at that stage. But when I have it is very hard to recognize them. They are quite independent.

Individual students are catered for through a number of strategies. Some students stand out as requiring further attention, and this is given. But Helen's strategy for keeping the quieter students engaged is to use a variety of methods.

> It is not massive changes; it is just making sure I always at some point give them an overview of what we've covered. I always try to pull it back at the end and go through what we've covered. I always give them step-by-step information, which may go on the student web. I always have a discussion of the main concepts as well.

Group learning is also included in Helen's teaching repertoire. She finds that this works well when older students are mixed with younger students and she encourages these groups to continue to get together in the out-of-class periods. Within these groups, students are very supportive of each other and skills acquired through life experiences can come to the fore and be valued by one another.

Helen assesses her students through a variety of approaches. For her, assessment is part of the teaching process and she provides alternative assessment tasks as a back-up if required to assess the students' achievement of competencies. These tasks may include role plays, performances or re-submits of written material.