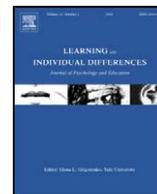




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## Approaches to studying, conceptions of learning and learning styles in higher education

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## ABSTRACT

Learning styles have been construed in different ways but traditionally have been regarded as relatively stable. In contrast, the “student approaches to learning” perspective tends to assume that approaches to studying are contextually driven. This article argues for a rapprochement between these two traditions. First, the evidence that students’ perceptions of their context determine their approaches to studying is open to other interpretations. Second, students’ approaches to studying depend as much on their conceptions of learning as on contextual factors. Third, students’ conceptions of learning seem to be relatively stable, even across an entire degree programme. This suggests that conceptions of learning fit the traditional notion of learning styles. Future research should explore the conceptual and empirical relationships between students’ learning styles and their conceptions of learning.

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### 1. Introduction

According to Entwistle and Peterson (2004), “Learning styles are relatively consistent preferences for adopting learning processes, irrespective of the task or problem presented” (p. 537). This is probably accurate as an account of the traditional core of the concept of learning styles, but the term has always been used in a wide variety of ways to describe differences in the way that people learn. More than 25 years ago, Curry (1983) tried to make sense of these various interpretations by grouping them under three headings: learning style as instructional preference, learning style as information-processing style and learning style as cognitive personality style. The different notions were assumed to vary in terms of the extent to which they could be directly observed and modified as a result of environmental influences, and as a metaphor to capture this, Curry likened them to progressively deeper layers of an onion. A recent survey of learning style researchers confirmed that they continue to employ a number of different definitions that vary (among other things) in whether learning styles are regarded as being relatively malleable or relatively stable (Peterson, Rayner, & Armstrong, 2009).

Over the same period, this research has been conducted in relative isolation from a different tradition that focuses on the quality of learning in higher education. This originated in the results of interview-based research that students seem to adopt different approaches to studying depending on the content, the context and the demands of particular learning tasks: a deep approach aimed at understanding the meaning of

the learning materials and a surface approach aimed at being able to reproduce those materials for the purposes of assessment (Laurillard, 1979; Marton, 1976; for a review, see Richardson, 2000). Various questionnaires have been developed to measure approaches to studying in larger numbers of students (e.g., Biggs, 1987; Entwistle & Ramsden, 1983). This view has been described as the “student approaches to learning” (SAL) perspective (Biggs, 1987). Its proponents insist that an approach to studying is “a context- and content-specific way of carrying out academic tasks” (Entwistle & Peterson, 2004, p. 537) and that their instruments are measures of how students approach learning in particular situations, not of learning style (see also Biggs, 2001).

In this article, I argue that there is a need for a rapprochement between classroom-based research from the SAL perspective and laboratory-based investigations of learning styles. The argument has three parts. First, there are several problems with the position that students’ perceptions of their learning context determine the approaches to studying that they adopt in that context. Second, students’ approaches to studying seem to depend as much on their conceptions of learning as on contextual factors. Third, students’ conceptions of learning seem to be remarkably stable, even across an entire degree programme. Indeed, they provide a different interpretation of the traditional notion of learning styles as “relatively consistent preferences for adopting learning processes.” I conclude by outlining the implications of this rapprochement for future research on conceptions and styles of learning in higher education.

### 2. Approaches to studying and perceptions of the academic environment

One implication of the SAL perspective is that it should be possible to bring about more desirable approaches to studying in university

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students through the use of appropriate course design, appropriate teaching methods or appropriate forms of assessment. This has been confirmed in studies comparing students following curricula using problem-based learning with students following curricula using a traditional subject-based approach (Newble & Clarke, 1986; Sadlo & Richardson, 2003). In other research, however, interventions aimed at inducing desirable approaches to studying have proved relatively ineffective (Gibbs, 1992; Hambleton, Foster, & Richardson, 1998; Kember, Charlesworth, Davies, McKay, & Stott, 1997). Eley (1992) found considerable variability in how different students perceived the demands of the same courses. This suggests that the impact of contextual factors on students' approaches to studying is mediated by their perceptions of their environment. Consequently, educational interventions will not be effective in changing students' approaches to studying unless they also serve to bring about changes in the students' perceptions.

To measure variations in students' perceptions, Ramsden (1991) devised the Course Experience Questionnaire (CEQ). The original version consisted of 30 statements in five scales reflecting different dimensions of effective instruction. Half of the items referred to positive aspects of courses, but the other half referred to negative aspects and are scored in reverse. From 1993 onwards, an adapted version of the CEQ was administered each year to all new graduates from Australian universities. This contained only 17 of the original 30 items, but it included a sixth scale concerned with the fostering of generic skills (such as problem solving or teamwork). For research purposes, Wilson, Lizzio, and Ramsden (1997) suggested that this sixth scale should be added to the original CEQ to yield a 36-item questionnaire, and subsequent research has shown that this version of the CEQ provides a reliable and valid way of monitoring students' perceptions (Richardson, 2009).

If the impact of contextual factors on students' approaches to studying is mediated by their perceptions of their academic environment, then there should be an intimate relationship between students' perceptions of their academic context and the approaches to studying that they adopt in that context. There is now an extensive body of evidence to support this idea: in particular, students with more positive perceptions of their academic context are more likely to adopt a deep approach and are less likely to adopt a surface approach. Richardson (2007b) summarised five studies which indicated that students' scores on the CEQ shared about half their variance with their scores on questionnaires concerning their approaches to studying.

Nevertheless, there are at least two major problems with this evidence. One is that it is wholly correlational in nature, and strictly speaking, it says nothing about either the nature or the direction of the underlying causal relationships. In particular, one cannot conclude that variations in students' perceptions are causally responsible for variations in their approaches to studying. Richardson (2006) applied path analysis to data from two different studies, and he concluded that the relationship between students' perceptions and approaches to studying was bidirectional: variations in certain aspects of the students' perceptions (in particular, the appropriateness of the assessment, the appropriateness of the workload and the amount of student choice) seemed to give rise to variations in their approaches to studying, but equally, variations in certain aspects of their approaches to studying (in particular, their use of a surface approach) seemed to give rise to variations in their perceptions. However, another possibility is that other variables give rise to variations in *both* students' perceptions *and* their approaches to studying (for example, variations in their conceptions of learning).

A second problem is the possibility that methodological artefacts are responsible for the apparent association between students' perceptions and their approaches to studying. In particular, the association might simply arise from the fact that the same student will fill out two different questionnaires in the same way. One example is an acquiescent response style, the tendency systematically to agree

with questionnaires rather than disagree with them. Some researchers attempt to control for this kind of response bias by including equal numbers of positively and negatively scored items, and this seems to have been Ramsden's (1991) intention when he devised the original CEQ. However, the negatively scored items are not distributed equally across the different scales of the CEQ, and the 36-item version of the CEQ advocated by Wilson et al. (1997) contains more positively scored items than negatively scored items. The questionnaires that have been designed to measure approaches to studying all contain only positively scored items.

Another example is an extreme response style, the tendency systematically to use the extreme response categories when completing a questionnaire rather than those in the middle of the response scale. It is more difficult to control for this kind of response bias: one possibility would be to score the responses simply as "agree" versus "disagree." In the way they are normally used, neither the CEQ nor questionnaires on approaches to studying control for extreme response style. Ray (1983) showed that acquiescent response style was relatively stable across different attitudinal questionnaires, and the same appears to be true of extreme response style (Richardson, 2010). Variations in response style might therefore be responsible *both* for variations in students' scores on the CEQ *and* for variations in their approaches to studying, and there might in principle be no direct relationship between their perceptions and their approaches. Clearly, researchers in the SAL tradition need to be more careful about controlling for such artefacts in their future investigations.

### 3. Approaches to studying and conceptions of learning

Even if one accepts the proposition that half of the variation in individual students' approaches to studying is caused by variation in their perceptions of the academic context, this raises the question of what causes the other half. Two investigations have indeed found that students show variations in their approaches to studying, even when variations in their perceptions of their academic context have been statistically controlled. The implication is that students vary in their approaches to studying in ways which are not influenced by the academic context and which are therefore consistent across different contexts.

The first investigation was reported by Sadlo and Richardson (2003). They found that students following problem-based curricula were more likely to adopt an orientation to the meaning of their course materials (i.e., a deep approach) than were students following subject-based curricula. The students who were following problem-based curricula also reported more positive perceptions of their programmes of study in their responses to the CEQ. However, the students who were following problem-based curricula were still more likely to adopt a meaning orientation than were the students who were following subject-based curricula, even when variations in their scores on the CEQ had been statistically controlled.

The second investigation was by Richardson, Barnes, and Fleming (2004). They found that deaf students were more likely to show an orientation to reproducing their course materials (i.e., a surface approach) than were hearing students. Both groups were also asked to complete the CEQ, and the deaf students reported perceptions that were at least as positive as those of the hearing students. Richardson (2008) subsequently found that the deaf students were still more likely to show a reproducing orientation than were the hearing students, even when variations in their perceptions had been statistically controlled. In both investigations, then, students varied in their approaches to studying even when they had been statistically matched in their perceptions of their academic context. Why should students with the same perceptions of their programmes exhibit different approaches to studying?

One possibility is that students adopt one approach rather than another depending on their conceptions of learning and of themselves as learners. To explain why different students adopted different approaches on the same programme, Marton (1976) suggested that students who adopt a deep approach to studying take an active role and see learning as something that they themselves do, whereas those who adopt a surface approach to studying take a passive role and see learning as something that just happens to them. This idea was elaborated by Säljö (1979), who identified the following five different conceptions of learning among Swedish students:

1. Learning as the increase of knowledge
2. Learning as memorizing
3. Learning as the acquisition of facts, procedures, etc., which can be retained and/or utilized in practice
4. Learning as the abstraction of meaning
5. Learning as an interpretative process aimed at the understanding of reality (p. 19).

Säljö described conceptions 1–3 as “reproductive” conceptions of learning and conceptions 4 and 5 as “reconstructive” conceptions of learning.

Van Rossum and Taylor (1987) similarly asked Dutch students to say how they approached their studies in general. They were able to classify the students into Säljö’s five conceptions of learning, but they found a sixth conception that they characterised as

6. A conscious process, fuelled by personal interests and directed at obtaining harmony and happiness or changing society (p. 19).

Van Rossum and Taylor found that older students were more likely than were younger students to hold more sophisticated conceptions of learning (i.e., conceptions 4, 5 and 6). Marton, Dall’Alba, and Beaty (1993) subsequently confirmed this sixth conception, which they referred to as “Changing as a person” (see also van Rossum & Hamer, 2010, pp. 7–9, 24–25, et passim).

Van Rossum and Schenk (1984) found that students with reproductive conceptions of learning tended to use a surface approach to studying, whereas students with reconstructive conceptions tended to use a deep approach to studying. Thus, the approaches to studying that students adopt in particular learning tasks seem to be linked to their conceptions of learning. This would explain why in the earlier examples students differed in their approaches to studying even when variations in their perceptions of their courses had been statistically controlled. First, in the study by Sadlo and Richardson (2003), the students who already held reconstructive conceptions of learning might have opted to study at the institutions that had introduced problem-based curricula, whereas the students who held reproductive conceptions of learning might have opted to study at institutions that had retained subject-based curricula. Alternatively, the students who followed problem-based curricula might have acquired more reconstructive conceptions of learning as a result of finding that they could regularly adopt a deep approach to their studies. Second, the study by Richardson et al. (2004) suggested that deaf students might be more likely to retain a reproductive conception of learning. This was mainly true of deaf students who preferred to use sign-language as a form of communication. Richardson (2008) suggested that this was because in mainstream classrooms these students were routinely exposed to sign-language interpreters who themselves held a reproductive conception of sign-language interpreting and of their role as sign-language interpreters.

As with approaches to studying, researchers have devised various questionnaires to try to measure conceptions of learning in larger numbers of students. Two of them are worth particular consideration for the purposes of this article.

### 3.1. The Reflections on Learning Inventory (RoLI)

This questionnaire was developed by Meyer and Boulton-Lewis (1997, 1999). It contained four scales concerned with knowledge of learning (how students know that they have learned something), three scales concerned with experiences of learning (how students feel when they are learning), one scale concerned with influences on learning (factors that have caused the students’ learning to develop as it has) and two scales concerned with conceptions of learning (students’ beliefs about learning in general). Morris and Meyer (2003) used a revised version of the RoLI in a longitudinal study of students at 20 schools of physiotherapy. Between the first and the second year of study, the students showed a very slight reduction in their scores on all ten scales, but this overall trend was not statistically significant. Morris and Meyer concluded that the students who participated in their study held very stable conceptions of learning over time. However, subsequent versions of the RoLI (e.g., Meyer, 2004) are concerned more with the processes of studying in higher education than with students’ underlying conceptions of learning.

### 3.2. The Inventory of Learning Styles (ILS)

Vermunt and van Rijswijk (1988) carried out interviews with 24 students who had recently embarked on distance learning courses with the Dutch Open University, and they found that Säljö’s (1979) different conceptions of learning “could easily be recognised” (p. 653). They distinguished between the *processing* activities that students used to learn specific materials and the *regulation* activities that students used to coordinate their processing activities. They argued that whether and how students regulated their processing activities depended on their conceptions of learning and on their motivation or orientation to their studies. The interviewees’ responses were then used to construct items in the ILS. The first section was concerned with study activities involved in the processing of course content and the regulation of learning. The second section was concerned with study orientations and with students’ conceptions of learning, education and cooperation. Responses given by 211 students taking courses with the Dutch Open University enabled these researchers to produce a revised version of the ILS with 16 scales. Brief descriptions of the five scales measuring different conceptions of learning, education and cooperation are provided in Table 1.

Subsequently, Vermunt (1996) carried out a more detailed analysis of the interview data that he had obtained with van Rijswijk. He identified four different conceptions or, as he characterised them, “mental models” of learning. These mental models were concerned

**Table 1**  
Conceptions of learning in the Inventory of Learning Styles.

Conception	Description of content
Construction of knowledge	Learning viewed as constructing one’s own knowledge and insights. Most learning activities are seen as tasks of students.
Intake of knowledge	Learning viewed as taking in knowledge provided by education through memorising and reproducing; other learning activities are tasks of teachers.
Use of knowledge	Learning viewed as acquiring knowledge that can be used by means of concretising and applying. These activities are seen as tasks of both students and teachers.
Stimulating education	Learning activities are viewed as tasks of students, but teachers and textbook authors should continuously stimulate students to use these activities.
Cooperative learning	Attaching a lot of value to learning in cooperation with fellow students and sharing the tasks of learning with them

Note: From Vermunt and Vermetten (2004, pp. 365–366).

with cooperating with fellow students and being stimulated by teachers, absorbing knowledge in order to pass examinations, constructing knowledge and taking responsibility for one's own learning and acquiring knowledge in order to apply it in practical situations. Vermunt argued that these were different aspects of four overarching “learning styles” and that students could adopt different styles as a response to the perceived demands of the educational context. In other words, he rejected the idea that a learning style was a relatively permanent aspect of an individual's personality:

“Learning style” means here a coherent whole of learning activities that students usually employ, their learning orientation and their mental model of learning; a whole that is characteristic of them at a certain period. Within this broader meaning learning style is thus a coordinating concept, in which the interrelations among cognitive, affective and regulative learning activities, mental models of learning and learning orientations are united. Learning style is *not* conceived of as an unchangeable personality attribute, but as the result of the temporal interplay between personal and contextual influences (p. 29).

As Richardson (2000, p. 162) pointed out, the components of Vermunt's model of constructive learning processes straddle all three “layers” or categories in Curry's (1983) “onion” model of learning styles that was mentioned in section 1 of this paper. The choice of processing and regulation strategies is influenced by the learning context, and so these belong to the first or second layer, instructional preference and information-processing style. In contrast, on this account, learning orientations and conceptions or mental models of learning are assumed to be relatively stable, personal characteristics, and so these belong to the innermost layer, that of cognitive personality style.

Vermunt (1998) developed a revised version of the ILS containing 20 scales including the five scales measuring different conceptions or mental models of learning. He showed that students' scores on the subscales measuring different regulation strategies could be predicted by their scores on the subscales measuring different mental models of learning and different learning orientations. Moreover, their scores on the subscales measuring processing strategies could be predicted by their scores on the subscales measuring different regulation strategies, mental models and learning orientations. These findings were taken as evidence for Vermunt and van Rijswijk's original assumption that the influence of students' mental models and learning orientations on their processing strategies was largely mediated by their use of different regulation strategies. These relationships are illustrated in Fig. 1.

Subsequent work confirmed that different students tend to exhibit four different combinations of mental models, orientations, regulation

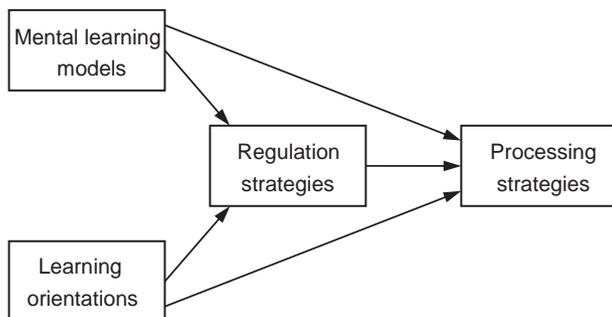


Fig. 1. Vermunt's (1998) model of the regulation of constructive learning processes. Reproduced with permission from the *British Journal of Educational Psychology*, © The British Psychological Society 1998.

strategies and processing strategies (Boyle, Duffy, & Dunleavy, 2003; Busato, Prins, Elshout, & Hamaker, 1998). Vermunt (2005) described these as meaning-directed learning, reproduction-directed learning, application-directed learning and undirected learning. However, he repeated his point that these were not “learning styles” in the sense of “an invariant attribute of students, deeply rooted in personality” (p. 207). Instead, he advocated that researchers should use the more neutral term “learning pattern” (see also Vermunt & Vermetten, 2004). This term is being adopted increasingly by European researchers. Nevertheless, Vermunt did not rename the ILS itself, which remains the Inventory of Learning Styles.

Vermunt (1996) acknowledged that “little is known about the manner in which students carry out these [learning] functions in a real educational context, and about the way in which this execution is regulated by internal and external sources” (p. 29). In the light of subsequent research, Vermunt and Vermetten (2004) were more definite:

Research on a course-specific level showed that students do vary in their use of learning strategies for different courses, but that students are also consistent in their strategy use over different courses. Accordingly, there seems to be both a context-specific and an individual-bound component in the use of learning strategies. All in all, this points to the conclusion that learning patterns are rather stable within a constant educational context, but that they can be changed (p. 379).

In fact, this quotation confuses two different hypotheses: stability or consistency in students' learning patterns across different courses might indicate some constant factor within the students themselves (an “internal” or “individual-bound” characteristic) or some constant factor within their educational context (an “external” characteristic). After all, different courses taught within the same institution might well share many features in common and thus offer a “constant educational context.”

Richardson (2007a) found that the section of the ILS concerned with mental models had satisfactory psychometric properties when used in a postal survey of students who were taking courses by distance learning. In a subsequent survey (Richardson, 2010), he found that students' scores on the relevant scales were strongly correlated with their approaches to studying: those who obtained higher scores on construction of knowledge were more likely to use a deep approach in their studies, whereas those who obtained higher scores on intake of knowledge were more likely to use a surface approach in their studies. This replicates the pattern that was obtained in the interview-based investigation carried out by van Rossum and Schenk (1984) and provides further evidence that the approaches to studying which students adopt in particular learning tasks are linked to their underlying conceptions of learning.

#### 4. Learning patterns or learning styles?

Was Vermunt right to reject the term “learning styles?” According to Peterson et al. (2009), more than 40% of learning style researchers are prepared to use the term to refer to “an individual's preferred ways of responding (cognitively and behaviourally) to learning tasks which change depending on the environment or context” (p. 520). Equally, mental models appear to be conceptually most closely related to the notion of learning style as a relatively permanent aspect of an individual's personality. Three published studies have produced evidence about the stability of students' scores on the ILS.

##### 4.1. Busato, Prins, Elshout, and Hamaker (1998)

These researchers used Vermunt's (1998) version of the ILS to explore whether there were any systematic changes during the

undergraduate programme in psychology at a Dutch university. They obtained responses to the ILS from 329 first year students who had attended an obligatory test session. They also carried out a postal survey of samples of 200 students in years 2–5 of the same programme and obtained responses to the ILS from between 32 and 45 students in each cohort. Although there were statistically significant fluctuations in the scores obtained by students in different cohorts on the scale measuring a meaning-directed learning style, there was no systematic trend on any of the scales over the 5 years of the programme.

Of the students who were surveyed in year 2 of the programme, 32 had completed the ILS during an obligatory test session held 14 months earlier during their first year of study. There were no significant differences between the scores they obtained on the two occasions. In a similar manner, of the students who were surveyed in year 3 of the programme, 26 had completed the ILS on two different occasions during their first year of study in connexion with another research project. In this case, there was a significant trend for their scores on the scale measuring a meaning-directed learning style to increase between years 1 and 3.

Unfortunately, this study is of limited value in the present context. First, the response rates for the postal surveys of students in years 2–5 were reported as being between 16.0% and 22.5%, and so there is the clear possibility of sampling bias in the results. In particular, there is no guarantee that the one significant (though relatively modest) difference between the scores in years 1 and 3 was not peculiar to the small proportion of the cohort who chose to respond to the survey in year 3. Second, the authors did not report whether their students had been exposed to any interventions in year 3 aimed at enhancing their learning styles. Finally, they did not report scores separately for the individual ILS subscales, and so there is no way of knowing whether the significant difference reflected a change in the students' mental models, their orientations, their regulation strategies or their processing strategies.

#### 4.2. Vermetten, Vermunt, and Lodewijks (1999)

These researchers selected 50 items from the ILS concerned with processing or regulation activities and 50 items concerned with mental models or study orientations. They gave the resulting instrument to students at a Dutch university at the end of their first and third semesters, instructing them to respond with regard to their experiences in the previous semester. Completed copies from both surveys were returned by 276 students in four different departments. The correlation coefficients between the scores obtained on each subscale were greater than .50, reflecting reasonable stability over a period of a year. There were significant changes on four of the scales measuring processing or regulation activities, but only one significant change on the five scales measuring mental models: the students showed a significant decline in their scores on the scale measuring intake of knowledge.

#### 4.3. Edmunds and Richardson (2009)

These researchers devised a short questionnaire consisting of English translations of 12 items from the mental models section of the ILS. These consisted of the four items that in an earlier study had shown the highest loadings on the factors representing construction of knowledge, intake of knowledge and use of knowledge, respectively. They administered this questionnaire in surveys of students from 15 departments in different UK universities. In each department, students were surveyed in the first year and the final year of the undergraduate programme. The former students were surveyed for a second time two years later, when they were in their third (and usually final) year of study. A total of 1365 sets of scores were

obtained across the three surveys, but there were no significant differences between them.

## 5. Conclusions and implications

In this article, I have suggested that students' approaches to studying in higher education may be related *both* to their perceptions of their academic environment *and* to their conceptions of learning and their conceptions of themselves as learners. Vermunt (1996, 2005) has always distanced himself from the idea that his notion of learning styles entails some relatively persistent underlying traits. Vermunt and Vermetten (2004) concluded that the stability of students' scores on the ILS was "rather high, but not so high that they should be conceptualized as unchangeable phenomena" (p. 372). As noted in section 3.2, they also acknowledged that such stability could be ascribed either to constant factors within the individual or to constant factors within the context. It follows that findings of high test–retest correlations on instruments such as the ILS are relatively uninformative regarding the existence or otherwise of learning styles in the traditional sense.

Nevertheless, a number of studies have found little evidence of changes in students' conceptions or mental models of learning from one academic year to the next or even over entire degree programmes:

- Busato et al. (1998) found no systematic changes in students' scores on the ILS in a cross-sectional study over a five-year undergraduate programme. In a longitudinal study, they found no significant differences in students' scores between years 1 and 2 of the programme. In a separate longitudinal study, they found just one significant change in students' scores between years 1 and 3, an increase in scores on the scale measuring a meaning-directed learning style.
- In a longitudinal study, Vermetten et al. (1999) found only one significant change in students' scores on the mental models section of the ILS between the first and third semesters, a decline in their scores on the scale measuring intake of knowledge.
- In another longitudinal study, Morris and Meyer (2003) found no significant differences in students' scores on the RoLI between years 1 and 2 of undergraduate programmes in physiotherapy.
- Finally, using a cohort-sequential design, Edmunds and Richardson (2009) found no significant differences in students' scores on the ILS scales measuring construction of knowledge, intake of knowledge and use of knowledge between the first and final year of their undergraduate programmes.

These findings suggest that students' conceptions or mental models of learning are relatively stable. Contrary to Vermunt's position, conceptions of learning would fit the traditional notion of learning styles as "relatively consistent preferences for adopting learning processes, irrespective of the task or problem presented" (Entwistle & Peterson, 2004, p. 537). On this basis, I conclude that there is a need for a rapprochement between classroom-based research carried out from the SAL perspective and laboratory-based investigations of students' learning styles. (Indeed, learning style researchers might also consider learning from the qualitative approaches within the SAL tradition.)

Such a rapprochement could have both conceptual and empirical implications for future research. Most researchers use the expression "learning styles" to refer to variations in students' observable behaviour or to variations in cognitive processes that are not necessarily amenable to introspection but can only be inferred from variations in behaviour (Peterson et al., 2009). This may well have been in keeping with the behaviourist legacy that dominated psychological research in North America for much of the 20th century but nowadays seems unnecessarily restrictive. In contrast, the SAL perspective is concerned with constructs that are not necessarily observable in students' nonverbal behaviour but have to be inferred from their self-reports in either

interviews or questionnaire surveys. A reinterpretation in terms of conceptions of learning would provide a stronger experiential underpinning to the notion of learning styles and render it more attractive to practitioners and to students themselves.

Coffield, Moseley, Hall, and Ecclestone (2004) published an incisive critique of learning style instruments, but they exempted questionnaires in the SAL tradition (such as the ILS) from their harshest criticisms. Many learning style researchers acknowledge the weaknesses of their current methodology, and some look to the SAL tradition to provide alternative forms of instrumentation (Peterson et al., 2009). Even so, this ignores the wealth of existing evidence concerning learning styles and their relationship with their attainment. A more constructive approach would be to investigate the extent of the empirical overlap between measures of learning styles and measures of conceptions of learning. The latter should include the mental models section of the ILS, which has already proved to be a robust tool in both campus-based and distance education. Such investigations would clearly need to control for artefacts such as the various forms of response bias discussed earlier. Nevertheless, mapping the relationship between learning styles and conceptions of learning can be expected to provide valuable information that enriches our understanding of the student experience in higher education.

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