Styles of practice: How learning is affected by students' and teachers' perceptions and beliefs, conceptions and approaches to learning

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Abstract

This special edition of *Research Papers in Education* features the work of members of the **E**ducation, **L**earning, **S**tyles, **I**ndividual differences **N**etwork (ELSIN), the only multi-disciplinary international research organisation specifically promoting the importance of work on styles and other individual learning differences within educational and workplace contexts.

The articles presented in this special edition consider relationships between styles variables (cognitive styles, approaches to learning and beliefs and conceptions of learning and teaching), and other individual learning differences (culture, experience and expertise) in relation to impacts on learning and teaching. These relationships are explored across a range of subject domains and cultural contexts (Portugal, Sri Lanka, Australia, UK, Belgium, and Italy) within higher education including both undergraduate and post-graduate academic and professional study.

This editorial highlights important discussions occurring within the styles field that have direct relevance for the development of effective 21st century learning environments. Informed by the six articles included in this special issue, we focus on the following themes: the potential of constructivist environments to effect change in learning behaviours; the notion of deep approaches to learning; relationships between approaches to learning and self-regulated learning; the varied learning and teaching responses of students/teachers to specific constructivist interventions including the identification of specific patterns of responses that are characteristic of highlighted groups; relationships between conceptions and approaches to learning and teaching. In addition, debates surrounding the nature of the relationships between perceptions, beliefs, conceptions, cognitive styles and approaches to learning in affecting learning outcomes, are explored.

Keywords: approaches to learning, cognitive styles, perceptions, beliefs, conceptions of learning and teaching; constructivist learning environments

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In the last six years, styles research has moved forward considerably, both conceptually and methodologically and in terms of its successful application within diverse learning environments (Evans and Cools (in press); Evans, Cools, and Charlesworth 2010; Rayner and Cools 2011; Zhang and Sternberg 2009).

In this editorial, styles research is used as an umbrella term to encompass cognitive styles, learning styles, approaches to learning, as well as student and teacher beliefs and conceptions of learning and teaching. In so doing, we are highlighting the need to consider more integrated models of styles dimensions that have the potential to capture major individual differences in the way people go about learning (Vermunt and Endedijk in press). In our work, and building on that of Rayner (2000) and Nosal (1990), we have confirmed the

complexity of styles by acknowledging the multi-faceted nature of an individual's personal learning style (Evans and Waring 2009) and the hierarchical nature of styles (Kozhevnikov 2007) respectively.

Overview

Within this special edition, three articles focus on the student perspective and a further three articles focus on the teacher educator perspective. Relationships between styles variables and other individual learning differences are explored across a range of subject domains (medicine, science, teacher education) and cultural contexts (Portugal, Sri Lanka, Australia, UK, Belgium, and Italy) within higher education including undergraduate and post-graduate academic and professional study.

From the student perspective, the first three articles explore the relationships between students' approaches to studying and performance; approaches to studying and perceptions of the learning environment and the relationship between cognitive styles, culture and perceptions of feedback (Albergaria Almeida, Teixeira-Dias, Martinh, and Balasooriya; Balasooriya, Tetik, and Harris; Evans and Waring, respectively). From the teacher perspective, articles 4 to 6 consider relationships between teachers' conceptions of learning to teach and their teaching strategies and preferred teaching approaches, as well as the impact of teachers' interpersonal attitudes on aspects of student learning (Donche and Van Petegem; Pedrosa-de-Jesus and da Silva Lopes; Mate, Brizio, and Tirassa).

The studies included in this special issue incorporate a variety of research designs and methodologies to include more mixed methods involving qualitative approaches in naturalistic settings, in addition to positivist laboratory-based quantitative studies. A significant role of this special issue is to continue to promote the use of interpretive

methodologies and research designs that are contextually nuanced, situated in constructivist settings and also drawing on socio-cultural perspectives (Marshall and Case 2005).

The articles highlight important themes that are directly relevant to all those involved in the design of effective learning environments, and in so doing, they provide a major contribution to the knowledge base on enhancing the application of styles research to practice within both educational and workplace settings. The key themes discussed include the potential of constructivist environments to effect change in learning behaviours; the notion of deep approaches to learning; relationships between approaches to learning and self-regulated learning; the varied learning and teaching responses of students/teachers to specific constructivist interventions including the identification of specific patterns of responses that are characteristic of highlighted groups; relationships between conceptions and approaches to learning and teaching. In addition, debates surrounding the nature of the relationships between perceptions, beliefs, conceptions, cognitive styles and approaches to learning in affecting learning outcomes, are explored.

The potential of constructivist environments to effect change in learning behaviours

Balsooriya et al. and Evans and Waring (this issue) provide evidence of the positive effects of interventions designed using constructivist principles, supporting the findings of Entwistle and Peterson (2004), Hativa and Birenbaum (2000) and Lea, Stephenson, and Troy (2003). Much of the literature, over the last two decades, reports on a great deal of the work done to enhance the design of so called 'new learning environments' (NLEs) (Simons, van der Linden, and Duffy 2000) using constructivist approaches with the aim of encouraging students to adopt deeper and more self-regulated/directed approaches to learning. Constructivism "... considers the learner as a responsible, active agent in his/her knowledge acquisition process" (Loyens and Gijbels 2008, 352). In their discussion of features

comprising a constructivist environment, they include the following: students actively constructing knowledge individually and through social interaction with others; students' agency in learning as self-regulated learners; authentic learning experiences resembling real life situations. The translation of constructivist learning principles into practice, however, has proven difficult and complex due to the different interpretations of what this actually involves, including how the different elements are meshed together (Harris and Alexander 1998).

Whilst the potential of NLEs to improve outcomes is evident, Haggis (2003) suggests such claims are ambitious given the reported stability of perceptions, conceptions and approaches to learning (Balasooriya, Toohey, and Hughes 2009; Gijbels and Dochy 2006; Segers 1996). Where success has been limited, a lack of constructive alignment between educational objectives and assessment has been given as one explanation (Biggs, 1999, Biggs, Kember, and Leung 2001; Struyven et al. 2006, 2008). In relation to the issue of constructive alignment, Evans and Waring (this issue) argue that the application of constructivist approaches to assessment (including feedback) has lagged behind other components of curriculum design and highlight the importance of the role of the student in acting on feedback (Gijbels et al. 2009; Segers, Gijbels, and Thurlings 2008). On the issue of assessment and its impact on students' approaches to learning, Karagiannopoulou and Christodoulides (2005) argue that assessment should be the first aspect of the educational culture on which educators should focus due to its link to levels of student satisfaction; others argue the greater importance of student/teacher perceptions of assessment demands. Following this line of argument, students' perceptions of the requirements of assessment and *not* the assessment itself are seen as the key to impacting on the approaches to learning individuals adopt (Biggs 1999; Ferla,Valcke, and Schuyten 2009; Gijbels, Segers, and Struyf 2008; Segers, Nijhuis, and Gijselaers 2006). Whilst most of these findings concern

student perceptions, we would argue that this could equally be applied to teacher perceptions, however, we know far less about teacher beliefs and further research in this area is needed to validate this viewpoint (Vermunt 2011). These debates concerning the influence of assessment also highlight the necessity for further research on the conditions under which assessment influences deeper approaches to learning (Gibbs and Simpson 2004).

Deep approaches to learning?

What constitutes a deep approach to learning is explored within this special issue. Understanding that approaches "are not characteristics of learners, they are determined by a relation between a learner and a context" is important; the notion of a deep learner is thus inappropriate (Struyven et al. 2006, 279). Albergaria Almeida et al. (this issue) identify the most successful students as those who knew when to use deep and surface approaches to achieve their end goal. Peterson, Brown, and Irving (2010) also acknowledge that those with more advanced conceptions of learning were more able to select the most appropriate learning processes for a task which included both deep and surface approaches. Combinations of deep and surface approaches although previously judged as 'disintegrated approaches' (Meyer, 2000), could, however represent more sophisticated use of approaches with students choosing to simultaneously combine approaches to achieve desired goals, as deep approaches do not necessarily exclude more surface ways of learning. There is still much that we do not know, for example, whilst the deep approach appears to represent a single, coherent concept, Haggis (2003) argues that there is little empirical support for a pure form of surface approach and that more elaborate analysis of the nature of students' learning is required. Considering the complexity surrounding the nature of approaches to learning, whilst Duarte (2007) identifies surface and deep approaches constituted as two opposing dimensions, Case and Marshall (2004, 606) argue that a bipolar description of approaches to learning may not

capture some of the nuances and subtleties in students' learning experiences. We need to know more about the nature of the interaction between styles, perceptions, conceptions and approaches to learning as well as being able to clarify the necessary components of a deep approach in relation to the needs of 21st century learning.

Approaches to learning and self-regulated learning

The relationship between approaches to learning and self-regulated learning (Duarte 2007) is one of increasing interest within NLE research. Donche and van Petegem (this issue) note that even though teachers highlighted the importance of student-centred learning conceptions and self-directed learning, they found this difficult to translate into practice. A number of questions arise surrounding this in relation to whether it is only student-centred approaches that facilitate self-direction, as is often assumed within the literature. Devlin (2006) questions whether it is necessary for a teacher to hold a student-centred conception of teaching in order to be an excellent teacher; a viewpoint implied in much of the literature (Kember 1997). Related to this, Gibbs and Coffey (2004) suggest that teacher-focus and student-focus are independent scales and not opposite ends of the same scale. Teachers could score highly on both scales. If so, Devlin argues that teaching development should aim to foster both approaches rather than assume one must precede the other and that teacher-focus is irrelevant to the development of self-directed approaches in learning.

In relation to the teaching requirements needed to encourage independence in learning, Silen and Uhlin (2008) argue that the meaning of the self-directed concept has been taken for granted for many years (Silen 2001) and has been interpreted as self-teaching and self-learning. Addressing this issue, Silen and Uhlin argue that students' feeling of being in charge and having a genuine impact on the learning situations are crucial for their desire to take responsibility (Ferla, Valcke, and Schuyten 2009). Similarly, Micari and Light (2009,

1737**)** note the " ability to self-regulate coincides with an ability to comfortably know that one does not know... confidence in managing one's own learning would seem naturally to increase comfort in confronting difficult or unfamiliar material". As identified in the articles in this issue (Albergaria Almeida et al.; Donche and van Petegem; Evans and Waring), feelings of being in charge are connected to understanding the demands of the learning context, experiences of managing and getting feedback. Supporting existing studies, students are reported as being not entirely positive about self-regulated studying (Hativa and Birenbaum 2000). Silen and Uhlin (2008) stress the importance of teachers' perceptions of design elements within constructivist learning environments such as problem-based learning and also argue the importance of how reflection is used with students along with authentic handling of groups. The notion of shared regulation posited by Donche and van Petegem (this issue) highlights the importance of collaboration between students and teachers in the process of becoming self-directed learners and proficient lifelong learners. Furthermore, Mate et al (this issue) highlight the importance of interpersonal relationships in affecting learning outcomes. With this in mind, Wubbels et al. (2006) stress the importance of student perceptions of good interpersonal relationships with tutors as important in affecting performance; to this equation, we would also add the importance of student-student relationships.

When trying to enhance self-regulation, there is a delicate balance between providing sufficient constructive friction for students and teachers to challenge existing ways of learning and teaching, and in providing an overwhelming amount of friction which may be destructive. A key issue here is in knowing at what level to place an intervention and with which learners (Heikkila and Lonka 2006). To foster self-directed learning more teacher-focused/centred activities are also important (Donche and van Petegem, this issue). In the pursuit of this, as they comment, direct instruction activities cannot be totally left out of the

teacher educators' repertoire of teaching strategies. In addition, as acknowledged by Rikers, van Gog, and Paas (2008), one must not forget that self-regulation also includes stepwise processing and so called 'surface approaches' such as memorisation and rehearsal which also play a key role in learning. The notion of self-directed learning and what best facilitates this is one worthy of further study as is the notion of co-directed learning, stressing the interdependence between learner and teacher. The extent to which self/co-regulation can be taught and to what levels is also open to debate.

Identification of patterns of responses

In the competitive higher education market, students demand satisfaction. They may prefer learning environments that are designed to cohere with their existing conceptions, rather than those designed to generate constructive friction by challenging existing conceptions of learning and teaching. Whilst more challenging environments are much valued in facilitating changes to beliefs and conceptions more readily, special attention needs to be given to the fact that some students/teachers will respond more favourably than others to such interventions given the interplay of styles variables and individual difference variables (Vermunt and Verloop 1999;Vermetten, Vermunt, and Lodewijks 2002). The variable response of students to interventions is discussed in the Albergaria Almeida et al.; Balsooriya et al., and Evans and Waring articles (this issue), suggesting that students did perceive the purposes and the context of their programmes in different ways. The issue is thus in regards to the provision and appropriate withdrawal of support to encourage independence in learning, requiring a delicate balance of providing enough support to allow new strategies to be developed without promoting undue anxiety (Entwistle and Peterson 2004); this requires a recognition and understanding of individual differences. Research suggests the importance of a differential approach and the need to focus more on those students who believe self-

regulation activities are not helpful (Loyens, Rikers and Schmidt 2008) whilst also attending to the needs of those who are already able to self-regulate their learning. In this way, careful consideration of the differential reactions to interventions designed to improve learning is required (Entwistle and Peterson 2004; Vermetten, Vermunt, and Lodewijks 2002).

Relationships between conceptions and approaches to learning and teaching

The articles in this issue also identify the complexity inherent in relationships between styles variables in that those students who adopted deeper approaches to learning did not necessarily have a preference for deeper teaching approaches (Albergaria Almeida et al.; Pedrosa and da Silva Lopes). Similarly, Donche and van Petegem identified that teachers' conceptions of teaching did not necessarily match their teaching strategies, pointing to both individual and contextual factors to explain such dissonance. Whilst Pedrosa and da Silva and Lopes agree with such explanations, like Mate et al. (this issue) they found greater degrees of congruence between conceptions and strategies although they also noted the relative stability of teachers' conceptions. These findings are congruent with those identified elsewhere in that we would expect both dissonance as well as congruence between learning and teaching styles. Learning styles do not necessarily match teaching styles (Evans 2004) and nor would we expect them to, given the complexity of styles. Each individual has the capacity to draw on a range of learning styles, however some may have more versatility in their use of styles than others. In addition, teachers have a repertoire of teaching styles to draw upon which will also be influenced by a number of individual difference and contextual variables.

The nature of relationships

The importance of students' perception of the learning environment is highlighted by Balasooriya et al. (this issue), who found that even though there had been changes to the

assessment design, some students did not perceive that a deep approach was required even though that was the intention of the curriculum designers. The notion that changing the nature of the learning context is sufficient to encourage students to adopt a deeper approach has been challenged elsewhere (Loyens, Rikers, and Schmidt 2008; Marshall and Case 2005). It is widely acknowledged that the learning context itself may be *less* important than how it is actually perceived by students and teachers in affecting their learning behaviours (Campbell et al. 2001; Kember, Jenkins, and Ng 2003; Prosser and Trigwell 1991)**.** It is these perceptions and beliefs that are seen as strong and significant predictors of individual change (Karagiannopoulou and Christodoulides 2005; Prosser 2004). We would also argue the need for congruence between student and teachers' interpretations of the importance of the value of modifications to the curriculum.

The position that learners' and teachers' beliefs and conceptions of learning and teaching are paramount in developing practice is justified by the constructivist position, however, Devlin (2006) argues that a focus on beliefs without a corresponding focus on knowledge may represent a misunderstanding or simplification of the constructivist position. Similarly, a focus on learning without a corresponding focus on natural predispositions and cognitive styles might be equally misguided. The fact that not all students and teachers perceive learning environments in the same way, as reported in this issue, highlights the importance of the study of individual differences and especially how cognitive styles and other styles variables mediate beliefs about learning environments and behaviours within them.

The intransigence of beliefs is highlighted in the literature (Opfer, Pedder, and Lavicza 2010). The evidence on whether approaches change as a consequence of educational experiences is inconclusive (Struyven et al. 2006). This has led many to question whether it is in fact possible to induce a deep approach within learners; and how mouldable learners and

teachers are (Gijbels et al. 2008; Gijbels et al. 2009; Haggis 2003: Struyven et al 2006). Rikers, van Gog, and Paas (2008) question why learners/teachers would change their beliefs that may have served them very well up to a specific point. Although others, argue the potential of learning interventions, focused on cooperative discussion and reflection on personal beliefs, to bring about change (Brownlee 2004; Marra 2005).

The acknowledged stability of beliefs also questions the ability of short-term fixes to facilitate long term changes in ways of learning and teaching (Richardson, 2005). As noted by Haggis (2003, 92) "questions remain about the possibility of manipulating the relationships between perceptions / conceptions / approaches and outcomes..." Alternatively, some see changeability as a feature of approaches to learning (Mattick, Dennis and Bligh 2004), arguing that approaches to learning are a phenomenon more influenced by the demands of particular learning environments than by predispositions of personality (Rhem 1995) and therefore defined by both features of the learning/ teaching environment, 'the context' and, student characteristics and experiences,' the learner'. Vernunt (1996, 1998) in his renaming of his *styles* to *patterns* has adopted this position arguing against the stability of styles constructs within his model. However, Pedrosa et al. (this issue) see conceptions as relatively immutable, a position that Richardson (in press) also comments on in suggesting that there are both elements of variability and stability in styles dimensions such as approaches to learning ,which requires a consideration of both perceptions and conceptions in their impact on learning behaviours.

Whilst articles in this issue draw attention to the complex nature of the relationships between beliefs, perceptions, conceptions of learning, approaches to learning and learning outcomes (Ake 2008; Campbell et al. 2001); there are questions over the order in which a sequence of change may occur. Whilst many argue that beliefs/conceptions are key to changing learning and teaching behaviours, and that genuine development will only come

about by addressing these (Entwistle and Walker 2000; Kember and Kwan 2000). Devlin (2006) argues that there is no clear empirical evidence that shows changes to beliefs and conceptions must *precede* changes to teaching practice. The implied directional influence that teacher conceptions drive teachers practices (Desimone 2009; Kane, Sandretto, and Heath 2002) which in turn influence the way students study (Gow and Kember 1991; Leung and Kember 2003) and the relative power and role of certain conceptions to influence change (Eley 2006).

Related to this line of argument, Pedrosa and da Silva Lopes (this issue) question the order of change and argue that although teaching conceptions drive internally teaching practices, such as questioning, external factors such as implementing a new teaching approach, in their case, teacher questioning skills, may actually lead to changes in beliefs (Guskey 2002). They also note that changes in beliefs and teaching and learning conceptions may not necessarily lead to changes in behaviours; conversely a change in teaching/ learning behaviours may not necessarily imply modification in teaching and learning conceptions (Rikers, van Gog, and Paas 2008).

The linear nature of relationships between variables is highlighted by Balasoriya et al. (this issue). However, Micari and Light (2009) and Opfer, Pedder and Lavicza (2010) also perceive the relationship between beliefs, practices, learning and changes in practice as reciprocally causative, fitting with the work of Myer (1996) and Birenbaum and Rosenau (2006). This two-way relationships between conceptions and approaches/cognitive processes, with conceptions being developed through experiences of teaching and studying, and then influencing subsequent ways of studying has also been acknowledged by Entwistle and Peterson (2004) and Boulton-Lewis et al. (2000). In Clarke and Hollingsworth's (2002) non-linear model, change in teaching practice precedes change in student learning outcomes, which then leads to changes in teacher beliefs. Change occurs through mediating processes in

four domains including sources of external information and support, teaching knowledge and beliefs, professional experimentation and outcomes (Devlin 2006). However, such bi-directionality has also been challenged; an alternative perspective is that students' perceptions of the learning environment influence approaches to learning and not the opposite way round (Diseth et al. 2006; Duarte 2007; Karagiannopoulou and Christodoulides 2005; Richardson 2002, 2005; Richardson and Price 2003).

Assuming that change is possible, we need to know more about the process. Entwistle and Peterson 2004, 409) question the nature of change and ask whether narrower learning conceptions become incorporated within broader ones. There is much debate concerning the role of conceptions in student and teacher learning particularly in relation to how conceptions change and evolve. Questions also arise over whether conceptions are bi- or uni-polar (Devlin 2006), and whether several conceptions can co-exist as well as how contextually related they are (Entwistle and Peterson 2004). A similar argument has been put forward in relation to whether conceptions of teaching, usually broadly split into two categories: teacher-centred/content oriented and student-centred/learning oriented (Kember, 1997), are actually independent scales and not opposite ends of the same scale (Gibbs and Coffey 2004) arguing that teachers could score highly on both areas.

When explaining students' approaches to learning, Balasooriya et al. (this issue) focus on the role of students pre-existing beliefs about learning, in hindering their willingness to embrace newer methods of learning. Explaining the weaker performance of certain students, Albergaria Almeida et al. (this issue) also highlight the importance of prior experiences of learning environments arguing that the 'newness' of the learning experience and environment was the problem. Similarly, the 'surface responding' students in the Balasooriya et al. study (this issue) were less able to find the most appropriate regulation strategies and also less likely to recognise important cues as to what areas were most

important to their development as medical professionals. Difficulties may be exacerbated for some students when moving from one known learning context to another less well known. Evans and Waring (this issue) note the importance of acknowledging the difficulties that some students face within new environments asking not only why some students are effective boundary crossers and other not? But also, how can we develop boundary crossing skills in students so they are more able to cope with the demands of 21st century learning? The role of cognitive styles and other individual difference variables, in addition to lack of prior experiences and tolerance of uncertainty in mediating access to environments, are important areas to consider. The impact of new environments on student approaches can be very powerful. Minasuan-Batmanian, Lingard and Prosser (2006) found that even those students with cohesive conceptions and thus more likely to adopt a deep approach to study than those with fragmented conceptions, still used surface approaches when faced with uncertainty within a new learning environment. For some students it was also linked to not knowing how to invoke a deep approach even if they wanted to.

The complexity and often found dissonance between teachers' conceptions of learning and their teaching strategies is commented on by all three articles focusing on the teacher perspective. The role of individual factors and teachers' interpretation of the context in translating beliefs into actions is highlighted. However, Pedrosa and da Silva Lopes (this issue) only found such dissonance with those teachers who had a conceptual change conception of learning; they conclude that "atypical combinations of conceptions and behaviours may reflect a compromise between intentions/conceptions of teaching and academic/social context" (Stark 2000; Trigwell, Prosser, and Waterhouse 1999). In developing this line of argument, Donche and van Petegem (this issue) note that an in-between position between student-centred and teacher-centred teaching practice could be a response to a number of factors (students needs where students need more support to develop

self-regulatory skills on the one hand and/or difficulties teacher educators have in translating principles of process-oriented teaching into practice as a result of lack of knowledge of the teaching environment; lack of teaching competence; lack of training). Mate et al.(this issue) argue the place of teacher expertise in mediating translation of beliefs into actions arguing that novice teachers are less successful in this respect than experienced teachers highlighting the need for time for novices to develop certain skills; however Birenbaum and Rosenau (2006) argue that shifts in opinion seem to occur out of necessity (e.g. taking up a new role / job), suggesting that job requirements or socialisation are most important and that change is not developmental. Whereas Opfer, Pedder and Lavicza (2010) and Wheatley (2002) argue the need for dissonance between personal expectations and sense of efficacy, seeing self doubt as the trigger in motivating teachers to learn (Cobb, Wood and Yacel 1990; Woolfolk Hoy, Hoy, and Davis 2009).

Donche and van Petegem (this issue) focusing on the interaction between individual and contextual variables in affecting teachers' approaches, found that although more experienced teachers were more likely to have student-centred conceptions of learning and teaching, all teachers regardless of experience, found translating conceptions into practice difficult especially in relation to teachers' fostering of self-directed ways of learning in learners. More work is needed to explore the interplay of variables implicated in this. As acknowledged by Vermunt and Endedijk (in press) we still know far less about the relationships between patterns of teacher learning and practice, including how teachers regulate their own learning, compared to student learning.

Enhancing the design of learning environments

The articles in this special issue highlight both the stability and the variability of individual responses to specific learning contexts. In summary, they suggest that to enhance practice, the following should be done:

(i) Going beyond ensuring constructive alignment between all elements of programme design by considering the process in an integrated, holistic approach and sustained way.

(ii) Clarifying the purposes and value of assessment ensuring that such experiences are authentic.

(iii) Providing on-going discourse with students to review the different ways that they can engage with feedback, including discussions around issues of control and responsibility within the feedback process.

(iv) Giving learners time and attention to enable them to express their ideas ensuring active engagement in the learning process.

(v) Tackling how students and teachers perceive the value of new approaches so that they see and are convinced of the value of such changes in approach and value new forms of learning is an *on-going* requirement requiring frequent revisiting or better still full integration into curriculum delivery. This requires the acknowledgement of the importance of students and teachers perceptions of the learning environment; careful induction and explicit discussion surrounding the use of specific techniques and clarity about roles and nature of relationships.

(vi) Addressing the emotional dimension of learning by supporting both teachers and students in the development of interpersonal skills. The importance of attending to students' perceived control over learning is important as this may influence students' acceptance or rejection of attempts to promote deeper and self-regulated approaches to study.

(vii) Addressing students' and teachers' prior experiences of learning and subsequent learning and teaching behaviours as a way of supporting learning transitions.

(viii) Ensuring appropriate scaffolding throughout the duration of a programme through graded exposure to new methods to enable learners to make better use of active learning opportunities. Such scaffolding may require the development of teaching and counselling strategies.

(ix) Alertness to the nature of individual and group differences whether 'surface responding' or adopting more 'flexible' approaches.

(x) Acknowledging both within group and between group differences and not assuming that groups are static in their approaches to learning.

(xi) As part of supporting self/co-regulation, encouraging a focus on the development of 'boundary crossing skills'. Training students in how to be more aware of their learning approaches in order to develop their metacognitive awareness to ensure more effective strategy use including better use of opportunities afforded to them and created by them.

(xii) Utilisation of peer observation and feedback especially in relation to the development of interpersonal group work skills.

(xiii) Enabling students and teachers to practice new skills within contexts ensuring consideration of the order and coherence of such activities.

Implications for further research

A multi-directional approach that considers beliefs, practices and change collectively (Opfer, Pedder and Lavicza 2010, 3) and [one] that takes "stock of a broader range of variables influencing the learning process" is needed (Goodyear and Hativa 2002; Loyens and Gijbels (2008**,** 354). The role of cognitive styles in explaining how people perceive and make sense of information is well reported in the literature (Riding and Rayner 1998), however integrated

studies considering the relationship of cognitive styles to other styles variables (Evans and Waring in press) and specifically studies considering styles, beliefs, conceptions and approaches to learning are few in number (Struyven et al. 2008). We need to know more about the nature of the relationship between these variables to better understand the processes at workto ultimately enhance learning and teaching.

In pursuit of a more integrated approach, future research needs to test more complete models (Ferla, Valcke, and Schuyten 2009) that consider the inter-relationships between styles, individual difference variables and context. Vermunt's (1998) model of learning comprising a set of congruent student cognitions about "learning and related phenomena (e.g. learning conceptions, academic self-efficacy, cognitions about the learning environment) is a step in the right direction in that it represents a departure from models looking at the effects of separate cognitions and instead considers the interactions between variables (Ferla, Valcke, and Schuyten 2009). In this way, we may be able to learn more about how approaches to learning, self-regulatory skills and cognitive strategies are related in order to facilitate more effective learning environments. In developing such integrated models, Greasley and Ashworth (2007, 820) argue that more attention needs to be paid to the students' construction of the thing to be learned, arguing that individual students apply different meanings to similar approaches.

In addition, to assist in the building of new integrative theories for explaining student learning and clarifying the concepts used in educational psychology, Heikkila and Lonka (2006) advocate the need for conceptual discussion in the field of educational psychology. The importance of also considering emotional variables (optimism; self-esteem and locus of control) is also highlighted. Another important addition, in building such a model, is the need to consider students' and teachers attempts to monitor, control and regulate their motivation or affect as important elements within self-regulated learning (Pintrich 2004).

To better understand teacher and student learning, more work is needed on how conceptions of learning in association with student perceptions and other styles variables impact on learning outcomes. We need to know the precise role that conceptions of teaching play in the process of teaching improvement and in ensuring quality of student learning (Devlin 2006). For example, in relation to conceptions of learning, Peterson, Brown, and Irving (2010) argue the importance of specific conceptions of learning over others in their potential to influence learning outcomes and referring to the work of Purdie and Hattie (2002), consider the role of conceptions focusing on the 'why' aspects of learning considering more global conceptions about intentions and strategies as having a more direct influence on learning.

There is a need for more cross-cultural and cross-disciplinary studies to further investigate the role of individual and contextual variables in relation to student and teacher learning, including the duplication of methodologies and use of instruments to triangulate findings. In addition, more longitudinal studies are required that consider the nature of changes in approaches to learning. We need to know if interventions aimed at enhancing more appropriate approaches enable sustained change. The role of context and experience requires more research and much could be learnt by considering the student and teacher perspectives collectively rather than separately.

Investigating the complexity of new learning environments, particularly in higher education, continues to be a challenge for future research "given the complex processess involving beliefs and practices and the way these interact with, and intersect with, context and structures ..." (Opfer Pedder and Lavicza 2010, 4). Furthermore, the implementation of constructivist principles into practice remains an issue (Tenenebaum et al. 2001).

The articles included in this special issue give examples of the ways in which interventions have been successful, as well as acknowledging associated limitations as well

as avenues for future research. The important role of individual variables in relation to each other and to contextual ones in shaping students' and teachers' approaches to learning and teaching has been established, but we need to know more about the processes at work and is so doing we will be better positioned to address the theory and practice gap. It is essential that learners (students and teachers), in the context of 21st century demands, are able to use, transfer and extend their knowledge and understandings within and across contexts. Notions of inter-dependent learning and mixed modes of delivery are becoming more important in this endeavour. Through using more integrated understandings of styles, acknowledging the complex relationships between cognitive styles/ beliefs /perceptions/conceptions and approaches to approaches, we may come to new understandings that enable us to combine " the best of different worlds for instruction" (Rikers et al. 2008, 466).

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References

Ak, A. 2008. A conceptual analysis on the approaches to learning. *Educational Sciences: Theory and Practice 8*, no. 3: 707-720.

Ashworth, P., and K. Greasley. 2009. The phenomenology of 'approach to studying': the idiographic turn. *Studies in Higher Education 34*, no. 5:561-576.

Balasooriya, C.D., S. Toohey and C. Hughes. 2009. The cross-over phenomenon: Unexpected patterns of change in students' approaches to learning. *Studies in Higher Education* 34, no. 7: 781-94.

Biggs, J. B. (1999). *Teaching for quality learning at university.* Buckingham: SRHE & Open University Press.

Biggs, J. B. 2001, Enhancing learning: a matter of style or approach? In: R. J. Sternberg, and L.F. Zhange (Eds) Perspectives on thinking, learning, and cognitive styles. Mahwah, NJ, Lawrence Erlbaum Associates: 73-102.

Biggs, J., D. Kember and D.Y.P. Leung. 2001. The revised two-factor study process questionnaire: R-spq-2f. *British Journal of Educational Psychology* 71, no. 1: 133-49.

Birenbaum, M. and S. Rosenau. 2006. Assessment preferences, learning orientations, and learning strategies of pre-service and in-service teachers. *Journal of Education for Teaching 32*, no. 2: 213-225.

Boulton-Lewis, G.M., F. Marton, D. Lewis, and L.A. Wilss. 2000. Aboriibal and Tiress strait Islander university students' conceptions of formal learning and experiences of informal learning. *Higher Education 39*: 469-488.

Brownlee, J.M. 2004. An investigation of teacher education students' epistemological beliefs: Developing a relational model of teaching. *Research in Education 72*: 1-18.

Campbell, J., D. Smith, G. Boulton-Lewis, J. Brownlee, P.C. Burnett, S. Carrington, and N. Purdie 2001. Students' perceptions of teaching and learning: The influence of students' approaches to learning and teachers' approaches to teaching. *Teachers and Teaching: Theory and Practice 7*, no. 2: 173-87.

Case. S., and D. Marshall 2004. Between Deep and Surface: Procedural Approaches to Learning in Engineering Education Contexts. *Studies in Higher Education* 29, no. 5: 605-615.

Clarke, D, and H. Hollingsworth. 2002. Elaborating a model of teacher professional growth. *Teaching and Teacher Education 18*: 947-967.

Cobb, P., T. Wood, and E. Yacel. 1990. Classrooms as learming environments for teachers and researchers. In R.B. Davis, C.A. Mayer, and N. Noddings. (Eds.) *Constructivits views on the teaching and learning of mathematics (*pp. 125-146). Reston, VA: National Coucnil of Teachers of Mathematics.

Desimone, L. 2009. Improving impact studies of teachers' professional development: toward better conceptualisations and measures. *Educational Researcher 38*, no. 3: 181-199.

Devlin, M. 2006. Challenging accepted wisdom about the place of conception of teaching in university improvement. *International Journal of Teaching and Learning in Higher Education*, 18, no. 2: 112-119.

Diseth, A., S. Pallesen, A. Hovland, and S. Larsen. 2006. Approaches to learning, cognitive style, and motives as predictors of academic achievement. *Education and Training 48*, nos.2-3: 156-169.

Duarte, A.M. 2007.Conceptions of Learning and Approaches to Learning in Portuguese Students Higher Education: *The International Journal of Higher Education and Educational Planning, 54*, no. 6: 781-794.

Eley, M.E. 2006. Teachers' conception of teaching, and the making of specific decisions in planning to teach. *Higher Education* 51: 191-214.

Entwistle, N.J., and E.R. Peterson. 2004. Conceptions of learning and knowledge in higher education: relationships with study behaviour and influences of learning environments. *International Journal of Educational Research 41*: 407-428.

Entwistle, N., and P. Walker. 2000. Strategic alertness and expanded awareness within sophisticated conceptions of teaching, *Instructional Science* 28: 335 – 361.

Evans, C. 2004. Exploring the relationship between cognitive style and teaching. *Educational Psychology 24*: 509-531.Evans, C., and E. Cools, E. 2009. The use and understanding of style differences to enhance learning. *Reflecting Education, 5*: 1-18.

Evans, C. and E. Cools. in press.New directions with styles research: applying styles research to educational practice. Learning and Individual Difference Journal (in press).

Evans, C., E. Cools, and Z. Charlesworth, Z. M. 2010. Learning in higher education – how cognitive and learning styles matter. *Teaching in Higher Education, 15*: 469-480.

Evans, C., and M. Waring. 2009. The place of cognitive style in pedagogy: realizing potential in practice. In L. F. Zhang, and R. J. Sternberg (Eds.), *Perspectives on the nature of intellectual styles* (pp. 169-208). New York: Springer.

Evans, C., & Waring, M. (2011). Enhancing feedback practice: A personal learning styles pedagogy approach. In S. Rayner & E. Cools (Eds.), *Style differences in cognition, learning, and management: Theory, research and practice* (pp. 188-203). New York, NY: Routledge.

Evans, C., and M. Waring. in press. Application of styles in educational instruction and assessment. In L. F. Zhang, R. J. Sternberg, and S. Rayner (Eds.) *The Handbook of Intellectual Styles* (in press).

Ferla, J., M. Valcke, and G. Schuyten .2009. Student models of learning and their impact on study strategies. *Studies in Higher Education 34, no. 2:*185-202.

Gibbs, G., and M. Coffey. 2004. The impact of training university teachers on their teaching skills, their approach to teaching and the approach to learning of their students. *Active Learning in Higher Education 5*, no. 1: 87-100.

Gibbs, G., and C. Simpson, C. 2004. Conditions under which assessment supports students' learning. *Learning and Teaching in Higher Education 1*: 3-31.

Gijbels, D., and F. Dochy. 2006. Students' assessment preferences and approaches to learning: can formative assessment make a difference. *Educational Studies 32*, no. 4: 399-409.

Gijbels, D., M. Segers, and E. Struyf. 2008. Constructivist learning environments and the (im)possibility to change students' perceptions of assessment demands and approaches to learning. *Instructional Science* 36: 431-443

Gijbels, D., L. Coertjens, G. Vanthournout, E. Struyf, and P. Van Petegem. 2009. Changing Students' Approaches to Learning: A Two-Year Study within a University Teacher Training Course Educational Studies 35, no. 5: *503-513.*

Goodyear, P., and N. Hativa. 2002. Introduction: research on teacher thinking, beliefs and knowledge in higher education. In N. Hativa, and P. Goodyear. (eds.) *Teacher thinking, beliefs and knowledge in higher education* (pp. 1-13). Dordrecht, the Netherlands: Kluwer academic publishers.

Gow, L., and D. Kember. 1993. Conceptions of teaching and their relationship to students learning. *British Journal of Educational Psychology* 63: 20-33.

Greasley, K., and P. Ashworth. 2007. T he Phenomenology of "Approach to Studying": The university student's studies within the lifeworld. *British Educational Research Journal 33*, no.6: 819-843.

Guskey, T. R. 2002. Does it make a difference? Evaluating professional development. *Educational Leadership 59*, no. 6: 45-51.

Haggis, T. 2003. Constructing images of ourselves? A critical investigation into 'approaches to learning' research in higher education. *British Educational Research Journal 29*, no. 1: 89-104.

Harris, K.R., and P.A. Alexander. 1998. Integrated, constructive education: Challenge and reality. *Educational Psychology Review 10*: 115-127

Hativa, N., and M. Birenbaum. 2000. Who Prefers What? Disciplinary Differences in Students' Preferred Approaches To Teaching and Learning Styles. *Research in Higher Education 41*, no. 2: 209-36.

Heikkila, A., and K. Lonka. 2006. Heikkila, Annamari; Lonka, Kirsti Studying in Higher Education: Students' Approaches to Learning, Self-Regulation, and Cognitive Strategies. *Studies in Higher Education* 31, no. 1: 99-117.

Kane, R., S. Sandretto, and C. Heath. 2002.Telling half the story; A critical review of research on tthe teaching belifes and practices of university academicds. *Review of Educational Research 72*, no. 2: 177-228

Kanselaar, G. and R. Wierstra. (2003). The impact of university context on European students' perception of learning environments. *Paper presented at the second workshop of the European network on powerful learning environments*, Antwerp, Belgium.

Karagiannopoulou, E., and P.Christodoulides. 2005.The Impact of Greek University Students' Perceptions of Their Learning Environment on Approaches to Studying and Academic Outcomes *International Journal of Educational Research* 43. No.6: 329-350

Kember, D. 1997. A reconceptualisation of the research into university academics' conceptions of teaching. *Learning and Instruction 7*, no. 3: 255-275.

Kember, D., W. Jenkins and K.C. Ng. 2003. Adult students' perceptions of good teaching as a function of their conceptions of learning - part 1. Influencing the development of self-determination. *Studies in Continuing Education* 25, no. 2: 239-51.

Kember, D., and K. Kwan. 2000. Lecturers approaches to teaching and their relationship to conceptions of good teaching. *Instructional Science* 28: 469 - 490.

Lea, S.J., D. Stephenson, and J. Troy. 2003. Higher education students' attitudes toward student-centred learning: Beyond 'educational bulimia'? *Studies in Higher Education 28:* 321-334.

Leung, D. Y. P. and D. Kember, D. 2003. The relationship between approaches to learning and reflection upon practice. *Educational Psychology* 23, no. 1: 61-71.

Loyens, S. M., R.M.J.P. Rikers, and H.G. Schmidt. 2008.Relationships between Students' Conceptions of Constructivist Learning and Their Regulation and Processing Strategies. *Instructional Science: An International Journal of the Learning Sciences* 36, no. 5-6: 445-462

Kozhevnikov, M. 2007. Cognitive styles in the context of modern psychology: Toward an integrated framework of cognitive style. *Psychological Bulletin 133*: 464-481.

Loyens, S.M.M., and D. Gijbels. 2008. Understanding the effects of constructivist learning environments: introducing a multi-dimensional approach. *Instructional Science 36:* 351-357.

Marra, R.M. 2005. The Impact of the Design of Constructivist Learning Environments on Faculty Teaching Epistemologies. *Learning Environments Research 8*, no. 2: 135-155.

Marshall, D., and J. Case. 2005. 'Approaches to learning' research in higher education: a response to Haggis. *British Educational Research Journal 31*, no. 2: 257-267.

Mattick, K., I. Dennis, and J. Bligh, J. 2004. Approaches to learning and studying in medical students: validation of a revised inventory and its relation to student characteristics and performance. *Undergraduate Medical Education* 38: 535-543

Meyer, J.H.F. 2000. The modelling of 'disssonant' study orchestration in higher education. European *Journal of Psychology of Education* 15: 5-18.

Micari, M., and G. Light. 2009. Reliance to independence: Approaches to learning in peer-led undergraduate Science, Technology, Engineering, and Mathematics workshops. *International Journal of Science Education 31*, no. 13:1713-1741.

Minasian-Batmanian, L.C., J. Lingard, and M. Prosser. 2006. Variation in student reflections on their conceptions of and approaches to learning Biochemistry in a first-year health sciences service subject. *International Journal of Science Education 28*, no. 15: 1887-1904.

Myer, D.G. 1996. *Social psychology* (4th Edn.). New York: McGraw Hill.

Nijhuis, J., M. Segers, and W. Gijselaers. 2008. The extent of variability in learning strategies and students' perceptions of the learning environment. *Learning and Instruction 18*, no. 2: 121-134.

Opfer, V.D., D.G.Pedder, and Z.Lavicza. 2010. The role of teachers' orientation to learning in professional development and change: A national study of teachers in England. *Teaching and Teacher Education* 1-11.

Nosal, C.S. 1990. *Psychologiczne modele umyslu* [Psychological models of mind]. Warsaw, Poland. PWN.

Peterson, E., G.T.L.Brown, and I. S.Irving. 2010. Secondary students' conceptions of learning and their relationship to achievement. *Learning and Individual Differences 20*, 167-176.

Pintrich, P.R. 2004. A conceptual framework for assessing motivation and self-regulated learning in college students. *Educational Psychology Review 16*, no. 4: 385-407.

Prosser, M. 2004. A student learning perspective on teaching and learning, with implications for problem-based learning. *European Journal of Dental education 8*, no. 2: 51-58.

Prosser, M., and K. Trigwell. 1999. *Understanding learning and teaching: the experience in higher education*. Buckingham: Society for Research in Higher Education and the Open University Press.

Purdie, N., and J. Hattie. 2002. Assessing students' conceptions of learning. *Australian Journal of Educational and Developmental Psychology 2*:17-32.

Rayner, S. (2000). Reconstructing style differences in thinking and learning: profiling learning performance. In R.J. Riding & S. Rayner (Eds.), *International Perspectives on Individual Differences* (pp. 115-180). Stamford: Ablex

Rayner, S. J., and E. Cools.. (Eds.) 2011. *Style differences in cognition, learning, and management: theory, research and practice.* New York: Routledge.

Rhem, J. 1995. Deep/surface approaches to learning: am introduction. The National Teaching and Learning 5:1-5 1995

Richardson, J.T.E. 2002. Variations in learning and perceptions of academic quality", in S. J. Armstrong. et al. (eds), Proceedings of the 7th Annual ELSIN Conference, Academia Oress Scientific Publishers, Ghent, Belgium (3-7).

Richardson, J.T.E. 2003. Approaches to Studying and perceptions of academic quality in a short web-based course. *British Journal of Educational Technology 34*, no. 4: 433-42.

Richardson, J.T.E. 2005. Students' Approaches to Learning and Teachers' Approaches to Teaching in *Higher Education Educational Psychology 25*, no. 6: 673-680.

Richardson, J.T.E. in press. Approaches to studying, conceptions of learning and learning styles in higher education *Learning and Individual Differences Journal.*

Richardson, J.T.E., and L. Price. 2003. Approaches to studying and perceptions of academic quality in electronically delivered courses, *British Journal of Educational technology 34*, no. 1:45-56.

Riding, R., and S. Rayner.1998. *Cognitive styles and learning strategies: Understanding style differences in learning and behaviour*. London: David Fulton.

Rikers, R.M.J.P., T. Van Gog, and F. Paas. 2008. The effects of constructivist learning environments: a commentary. *Instructional Science 36*: 463-467.

Segers, M.D. 1996. Assessment in a problem-based economics curriculum. In M. Birenbaum and F. Dochy (Eds.) *Alternatives in assessment of achievements, learning processes and prior learning* (pp. 201-226). Boston: Kluwer Academic Press.

Segers, M., D. Gijbels, and M. Thurlings. 2008. The relationship between students' perceptions of portfolio assessment practice and their approaches to learning. *Educational Studies 34*, no. 1:35-44.

Segers, M., Nijhuis, J., and W. Gijselaers. 2006. Redesigning a learning and assessment environment. The influence of students' perceptions of assessment demands and their learning strategies. *Studies in Educational Evaluation 32:* 223-242.

Silén, C. 2001. Between chaos and cosmos – a driving force for responsibility and independence in learning. The power of problem base learning. PROBLARC, the 3rd Asia Pacific conference in PBL, Dec 9-12, University of Newcastle, Australia.

Silén, C., and L. Uhlin. 2008. Self-directed learning- a learning issue for students and faculty. *Teaching in Higher Education 13*, no. 4: 461-475.

Simons, R.J., J. van der Linden, and T.Duffy. 2000.New learning: three ways to learn in a new balance. In R.J. simons, J. Van der Linden, and T. Duffy (eds.) *New learning* (pp.1-20). Dordrecht: Kluwer Acdemic Publishers.

Stark, J.S. 2000. Planning introductory college course: content, context and form. *Instructional Science* 28: 413 - 438.

Struyven, K., F. Dochy, S. Janssens, and S. Gielen. 2006. On the dynamics of students' approaches to learning: The effects of the teaching/learning environment. *Learning and Instruction 16*, no. 4:279-294.

Struyven, K., F. Dochy, S. Janssens, W. Schelfhout , and S. Gielen.2008. The effects of hands on experience on students' preferences for assessment methods. *Journal of Teacher Education 59*, no. 1: 69-88.

Tenenbaum, G., S Naidu, O. Jegede, and J. Austin. 2001. Constructivist pedagogy in conventional campus and distance learning practice: an exploratory investigation. *Learning and Instruction 11*:87-111.

Trigwell, K., and M. Prosser. 1991. Relating approaches to study and quality of learning outcomes at the course level. *British Journal of Educational Psychology* 61: 265-75

Trigwell, K., M. Prosser, and P. Taylor. 1994. Qualitative differences in approaches to teaching first year university science. *Higher Education* 27: 75-84.

Trigwell, K., M. Prosser, and F.Waterhouse. 1999. Relations between teachers' approaches to teaching and students' approaches to learning. *Higher Education 37*, no. 1:57-70.

Vermetten Y., J.D. Vermunt, and J. Lodewijks. 2002. Powerful Learning environments. How university students differ in their responses to instructional measures. *Learning and Instruction 12:263-284.*

Vermunt, J.D. 1996. Metacognitive, cognitive and affective aspects of learning styles and strategies, a phenomenographic analysis. *Higher Education 31*: 25-50.
Vermunt, J.D. 1998. The regulation of constructive learning processes. *British Journal of Educational Psychology 68*: 149-71.
Vermunt, J. D. 2011. Patterns in student learning and teacher learning: Similarities and differences. In S. Rayner, and E. Cools (Eds.), *Style differences in cognition, learning and management: Theory, research and practice* (pp. 173-187). New York: Routledge.
Vermunt, J.D., and M. Endedijk. In press. Patterns in teacher learning in different phases of the professional career. Learning and Individual differences Journal.
Vermunt, J.D., and N. Verloop. 1999. Congruence and friction between learning and teaching. *Learning and Instruction 9*: 257-280.
Wheatley, G.H. 2002. The potential benefits of teacher efficacy doubts for educational reform. *Teaching and Teacher Education 18*:5-22.
Woolfolk Hoy, A., W.K. Hoy, and H.A.Davis.2009.Teachers' self efficacy beliefs. In K. Wentzel, and A. Wigfield (eds.) *Handbook of motivation in school* (pp. 627-655). Mahwah, NJ: Lawrence Erlbaum.
Wubbles, T.H., M. Brekelmans, P. den Brok, and J. Tartwijk. 2006. An interpersonal perspective on classroom management in secondary classrooms in the Netherlands. In C. Evertson and C. Weinstein (eds.) Handb*ook of Classroom Management: Research, practice, and contemporary issues* (pp.1161-1192). Mahwah: Laurence Erlbaum Associates.
Zhang. L. F., and R.J. Sternberg.2009. (Eds.) *Perspectives on intellectual styles. New York:* Springer.