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REVIEW ARTICLE

Building Bridges: Seeking Structure and Direction for Higher Education Motivated Learning Strategy Models

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Abstract Many of our current higher education (HE) learning strategy models intersect at important points. At the same time, these theories also often demonstrate important unique perspectives on student learning within HE. Currently, research with one learning strategy model rarely leads to developments in others, as each group of researchers works in close but largely unconnected islands of learning strategy investigation. This integrative theoretical review aims to support the convergence of intersecting models and (at the same time) the sharing of their unique features. These aims are undertaken first by reviewing past discussions of the divide between established European and American learning strategy models (Pintrich, *Educational Psychology Review*, *16*, 385–407, 2004). Then, as an example of how general models (e.g. 3P; Biggs, *Higher Education*, *12*, 73–86, 1993) might better support HE learning strategy development and convergence, the potential incorporation of perceived control theory (Skinner 2017) is reviewed. The theoretical support that this particular theory offers for explaining 3P sequential and reciprocal connections is discussed. Furthermore, the organisational and thereby alignment opportunities of this additional structure are presented and reviewed. In addition to implications for future theory and practice, alternative theoretical integration approaches are discussed.

Keywords Motivated strategies · Perceived control · Integrative theoretical review

Introduction

Experimental research during the 1970s raised interest in the nature of student learning within higher education (HE). The modern birth of large-scale research in HE student learning is marked by the concurrent formalisation of distinctly American and European/Australian conceptual frameworks each describing how individuals learn. The heart of these frameworks is concerned with how and

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why individuals process content. This period of learning strategy research (1970s–1980s) is exceptional both as a creative beginning and as a point of divide that has created two distinct research lineages. A European "context-embedded intention processing" lineage derived from early experimental work (Marton and Säljö 1976a, b) and expanded in scope through interviews (e.g. Entwistle and Ramsden 1983) and inventory development (e.g. Biggs 1987; Entwistle and Waterston 1988). In the USA, a "processing and motivation" lineage was derived from early cognitive processing research (see Schmeck 1988; Weinstein and Mayer 1986) and expanded in scope through models integrating research in the burgeoning areas of motivation and self-regulated learning models (e.g. Pintrich et al. 1991; Weinstein et al. 1987). Finally, running parallel to these early developments, work in the area of metacognition (e.g. Baker and Brown 1984; Flavell 1979, 1987) sowed the early seeds of self-regulation.

Since the 1980s, hundreds of studies employing inventories arising from these research lineages, in a wide range of cultural contexts, have been published. Despite the apparent empirical success of the field during the past four decades, HE learning strategy research has also faced considerable direct (e.g. Coffield et al. 2004) and indirect (e.g. M. Richardson et al. 2012) criticisms for the poor reliability/validity of its constructs and their often relatively low predictive power. These criticisms are concurrent with an apparent stalling in terms of theoretical advances in the field. Furthermore, following the early American and European research divide on processing and the rise of self-regulated learning models, the field has continued to fracture/fragment into overlapping, but distinct islands of research perspectives, with few efforts at integration. Recently, research seeking to integrate with prominent psychological theories has become more common (e.g. Fryer et al. 2016; Kyndt et al. 2015; Trigwell et al. 2012). Without a strong theoretical connecting structure, however, this path to innovation is unlikely to instigate the replications necessary for acknowledgement by, and eventual integration with, the broader field of HE motivated learning strategy research.

The current theoretical integrative review therefore seeks to explore the fact that while a handful of well-known models of HE learning strategies dominate the field, there has been scant recent theoretical development and substantive integration across these models. This is a significant issue given the defining role that these models play within our understanding of learning quality within HE, which itself is being forced to adapt to a rapidly changing world. By supporting greater communication between these models, we might enhance opportunities for these models to learn from each other's unique aspects. They might also better understand the components that they share and build on them together rather than separately. Creating these opportunities is particularly important in the case of the American and European learning strategy research traditions. While they have very different origins and perspectives on learning strategies, they are both seeking to understand and thereby support HE learning. An integrative path forward has the potential to highlight areas where the models might work together—in part or in whole—towards a better overall understanding of student learning in HE.

To meet the aims presented, this integrative review begins first by seeking to redress the acknowledged (Pintrich 2004) divisions between important European and American learning strategy models. Building on issues Pintrich raised, we draw on established broad psychological theory to support one potential bridge for our understanding of the intersection between, and unique aspects of, longstanding learning strategy models. We will also return to the theoretical impetus for Biggs' important attempt to connect the various aspect of the learning experience within a single model, seeking to reenergise these integrative efforts (Biggs 1993).

The current theoretical integrative review draws on broad (need for competence; White 1959) and specific (perceived control: Rotter 1966; Skinner et al. 2010; for a recent

comprehensive review, see Reich and Infurna 2016) elements of control as a meta-theory, which are directly related to elements of widely used expectancy theories (e.g. expectancy-value; Eccles et al. 1983; self-efficacy; Bandura 1989) as well as other theories related to students' achievement emotions (control-value theory; Pekrun 2006) and perceptions of intelligence (theories of intelligence; Dweck 1991). This general theoretical area is drawn on because of its specific focus on the target of learning strategies (increased competence) rather than its many important correlates (e.g. value, interest and achievement). Perceived control theory, specifically, is pursued as a potential organising theory chiefly because of (a) its clear modelling of the sequential and reciprocal interaction between the environment, strategies and outcomes; (b) its companion theory for understanding how the learning environment can support and hinder learning through students' perceptions of control; and (c) the organisation opportunities that it provides based on its continuums of perceived control and perceived structure.

This integrative theoretical review returns briefly to systems theory (Von Bertalanffy 1950, 1972) as a central source of purpose for Biggs' presage (prior to learning), process (learning processes) and product (learning outcomes) model (3P; Biggs 1993; Biggs and Collis 1982). This review discusses why this purpose has not been sufficiently met. Towards this original intention, the current review offers one potential means of both additional structure and direction for integrative hypothesis development across our established HE models of motivated learning strategies.

Segregation and Integration of Higher Education Research

Division in the Field

It is difficult to believe that in this connected age that our understanding of learning within HE is still segregated into largely unconnected models. The divisions are most readily visible in published HE research. As presented by Tight (2014), a bibliometric analysis portrays HE research as currently "working in separate silos".

In the area of motivated learning strategy research specifically, three chief divisions have persisted for more than four decades. The first, consistent with HE publishing patterns, is the Atlantic. American researchers in this area have classically worked within one of two models of processing commonly employed in HE research. The first is the memorization/elaboration distinctions made well known by Weinstein and Mayer (1986) and later integrated as one part of the widely used Motivated Strategy Learning Questionnaire (Pintrich et al. 1991, 1993). The second, which is related, but with a clear developmental aspect, is the Model of Domain Learning (MDL; Alexander 1997, 2003; also see Dismore this issue). This research continues to centre on the role of domain-specific interest and competence development within the quality of students' processing. European/Australian processing researchers, however, have commonly worked within the Student Approaches to Learning model (SAL; Marton and Säljö 1984). This research has focused on the interaction between students' paired intention processing and their learning environment at the departmental (e.g. Ramsden and Entwistle 1981; Fryer 2016) and course (e.g. Diseth 2007, J. T. E. Richardson and Price 2003) level. This interaction, both at the inception of the field (Marton and Säljö 1976a, b) and recently employing eye tracking (i.e. Catrysse et al. 2016), has also been examined at the task level. A second division is the partially parallel field of self-regulated learning (SRL; Winne 2013; Pintrich and Zusho 2002; also see Zusho this issue for a HE review of the field), which in fact

incorporates cognitive processing as an important component within its model. The third division is related to the second and that is the level of examination/measurement: from task/event to course to discipline/department to general pattern of learning.

Past Efforts at Integration

The conceptual gap between strategic processing (SAL in this case) and SRL was addressed previously in Pintrich's (2004) contribution to the previous special issue in the current journal dedicated to students' motivated learning strategies. Therein, he presented two commensurate and two incommensurate aspects of these models. Furthermore, he discussed the relative grain size of these models: smaller for SRL and larger for SAL. As part of his conclusion, Pintrich presented a preliminary stance on two key issues related to these models: (a) that SAL was more appropriate for faculty instructional support due to its relative simplicity and immediate practical implications for teaching and (b) that without the use of a robust top-down theory for interpreting SAL, integration of the two models for learning was unlikely.

Addressing Key Issues Raised by Pintrich (2004)

Grain Size

The conceptual gap between SRL and strategic processing (e.g. SAL) with regard to grain size/level of measurement is not as wide as Pintrich (2004) suggested. While it is true that SRL research has a long theoretical and increasingly empirical tradition of research focused on task-level (e.g. Winne and Marx 2012) and event-level regulatory measurement (e.g. Winne 2010), it is also true that there is a longstanding tradition of examining SRL at the Aptitude (Winne and Perry 2000) or Pattern level (Gijbels et al. 2014). This is supported by the substantial body of research that has arisen from the use of inventories such as the Learning and Study Strategy Inventory (LASSI; Weinstein et al. 1987), Motivated Strategy for Learning Questionnaire (Pintrich et al. 1993) and the Inventory of Learning Styles (see Vermunt and Donche this issue). With regard to European and Australian SAL research, it should be remembered (see J. T. E. Richardson 2015) that the seeds which grew into research programs of Aptitude/Pattern level examination of students' approaches to learning (e.g. Biggs et al. 2001; Entwistle et al. 2002) actually began as (and remain theoretically robust as) an investigation into task-level processing (Marton 1975; Marton and Säljö 1976a, b). Furthermore, recent investigations into the nature of SAL have again begun to address the event-level interaction between learning environment cues and the quality of processing (Catrysse et al. 2016), while separate lines of investigation explore SAL developmental elements (Asikainen and Gijbels this issue).

While SRL and SAL are theoretically very different learning strategies, the current review posits that, strictly with regard to their potential grain size, the gap between SAL and SRL perspectives is not necessarily wide. Both models have been conceptualised and applied across task and course levels of learning.

Supporting Student Learning by Educating Faculty

Pintrich suggested that SAL was perhaps the more appropriate model for faculty support and that SRL was more relevant to researchers in the field. SAL was originally and again is

presently being examined at the smaller grain size of tasks. Furthermore, SRL has long been researched at a grain size sufficient to be useful to HE educators. Vermunt's research program into the patterns of HE students' learning (processing, regulation, motivation and epistemologies) supports the essential role of faculty in supporting students in regulating their studies (Vermunt 1986, 1988, 1998; Vermunt and Rijswijk 1988). Vermunt's conceptualisation of how regulation applies to teaching approaches within a broad range of progressive HE curricula is presented in a recent monograph chapter (see Vermunt 2007). This suggests therefore that either model of motivated strategy can be understood at both large and small grain sizes. As both are relevant to the quality of instruction within HE, there should be no absolute division here either.

Towards a Potential Bridging Theory

The final issue highlighted from Pintrich's (2004) attempt to begin to reconcile SRL and SAL is one that the current manuscript aims to start to address in the remainder of this integrative theoretical review: i.e. connecting American and European research in this area. Pintrich was correct in so far as the experimental and then phenomenographic origins of SAL are a serious barrier to meaningful integration with other models of motivated learning strategies. Pintrich (2004) was correct that a top-down theory, which overlaps with both American and European/Australian models, is a necessary bridge if these islands of learning strategy research are to learn from each other. As noted in his review, and the SRL review in this special issue (Zusho this issue), SRL and SAL, as a pair of examples, do in fact overlap at many levels. For example, both models include cognitive, meta-cognitive and motivational elements. On the other hand, their substantive differences, such as the integration of modern motivational theory within American (SRL) models and the interaction between the learning environment and students' intention/processing in the European/Australian (SAL) models, are areas where theoretical bridges might support sharing and future codevelopment. More than one theory might act as a bridge for HE motivated learning strategy models. However, one meta-theory, which centres squarely on the chief objective of learning strategies and has substantial history within modern educational psychology, stands out: the psychological need for competence (White 1959). Furthermore, the current review proposes that among the many sub-theories of this meta-theory, perceived control has a strong propensity to act as a bridge for our models of motivated learning strategies. The specific reasons for this suggestion and alternative theories are discussed in future sections.

Rather than proceeding directly from Pintrich's (2004) call to action, it is important to first highlight the strengths and weaknesses of efforts by a contemporary of Pintrich to address some of these issues, albeit from another direction. Biggs' long-running teaching-learning discussions (e.g. Biggs 1985, 2003; Biggs and Collis 1982) and foray into applying systems theory (Von Bertalanffy 1950) with the 3P model sought to lend structure to our questions regarding student learning. These theoretical structures were helpful steps: the 3P framework (building on Dunkin and Biddle 1974) presented the logical, complex sequential and reciprocal interactions of the learning experience across three straightforward components: presage, process and product (Fig. 1; Biggs 1993).

In Biggs' final adjustment to the 3P model, he noted that there was no more that could be added, for at that point, everything was reciprocally connected. The 3P model was a useful step towards the organisation of our understanding of learning processes, but it failed to meet some of the original goals of a systems theory approach. Specifically, it failed to meaningfully

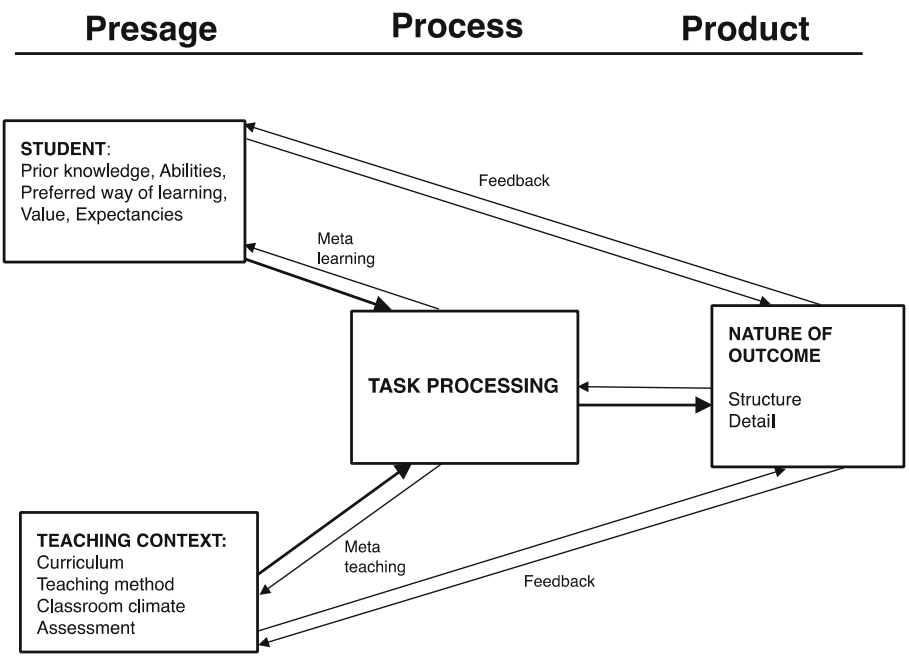

Fig. 1 3P model from Biggs (1993)

support the convergence of overlapping learning theories. Furthermore, the 3P model did not provide clear theoretical justification for developing hypotheses regarding the multitude of connections presented. In the next sections, which present a means by which these issues might be overcome, it is important to understand that the current review is focused solely on motivated learning strategies in the context of HE rather than learning in general.

A Common Theoretical Structure

A way forward on the integration of motivated strategy theories might be by further exploring established theories. First, systems theory's role within the development of the 3P model is reviewed. Second, a potential bridging theory is discussed. In addition to organising the serial (and reciprocal) relation between different structures within learning (i.e. horizontally), it is also important to implement a common theory that can lend theoretical justification to the connections presented by the 3P model (reciprocal and sequential). Finally, this bridging theory should also provide some preliminary direction regarding the relationships between these components at each P-stage (i.e. laterally). Both the second and third suggestions are necessary for the development of robust hypotheses regarding the predicted effects implicitly presented by the model. For example, how do enhanced learning outcomes reciprocally affect future learning strategies (Biggs 1993)? Or how does teaching quality enhance or hinder students' processing of course materials (Entwistle and Ramsden 1983)? And finally, how might high self-efficacy support both approaches to learning (Trigwell et al. 2012) and SRL (Schunk 2001)?

Initially, systems theory is reviewed, with a focus on its general aim and the gap in its application via the 3P model. Then, the need for competence, as a meta-theory for understanding achievement motivation, is reviewed. Following directly, the sub-theory perceived

control is discussed. The discussion focuses on (a) its potential both as a continuum for organising many constructs key to the 3P modelling of established motivated learning strategies (across internal-external-lack of control) and (b) its theoretical rationale for important sequential and reciprocal connections presented by the 3P model. After discussing the sequential and reciprocal support that perceived control might lend, an integrative model, which incorporates the 3P structure horizontally and perceived control organisation laterally, is presented and reviewed. This model is reviewed alone, followed by a discussion of its potential role as an organising and integrating force for important presage, process and product components. The current integrative review ends with proposed theoretical implications, alternative paths forward, potential directions for future research and some preliminary conclusions.

Systems Theory and the "Swamp" of Learning

By using systems theory to connect the 3P model and thereby make sense of the "educational swamp" (Biggs 1993), he opened the door to talking about the reciprocal connectedness of instruction/individual differences, learning/studying and outcomes. This was convenient because it was consistent with the inherent connectedness of the components of learning.

Systems theory is commonly traced back to theorising about biological systems (for a comprehensive review, see Von Bertalanffy 1950), which, although built on physical theories such as thermodynamics, also deny them—at least for a measure of time. General systems theory has now been applied across nearly every imaginable field. In many of these applications, however, a few aspects are consistent, two of which are important for the current issue. The first is to support the modelling of the interconnected nature of phenomena. This is something represented in the 3P model but not supported clearly by theory. Second, a research program using a general systems theory approach should seek to "minimise the duplication of theoretical effort in different fields…promote the unity of science through improving communication among specialists" (from the task group on General Systems Theory and Psychiatry; cited in Von Bertalanffy 1972, p. 413). The 3P model certainly had some success with the latter, as it provided a common framework for testing theories about learning. The common framework, which any arrangement of constructs could utilise, however, failed to include any structure which might orient constructs across a common scale and offer a means of comparing related constructs. With a means of organising variables across a shared continuum, we might eventually work towards reducing duplication in the components that we utilise in our motivated learning strategy models—as suggested by systems theory. A shared continuum might enable competing/overlapping models and constructs to "tend toward further integration" (p. 416, Von Bertalanffy 1972). The nature and role of this shared "latent" scale are presented and elaborated on in the following sections, after a brief rationale for the chosen theoretical direction.

Towards Further Integration

Further to the Pintrich suggestion that a top-down theory for SAL is a necessary step for meaningful integration, the potential top-down theory should also be meaningful for other models of motivated strategies. Such a theory necessarily needs to be broad enough to connect learning strategy theories but need not entirely encapsulate them. This theory should provide support for these models to be compared across many shared aspects and also support

cross-model sharing of unique aspects. In choosing a potential linking theory, it is important that we remember that both SRL and SAL (using these models as starting points) are strategies individuals use when trying to enhance their competence in a specific domain. Within many formal learning contexts, SRL and SAL are often coping strategies: coping with the vast amount to be learned, instruction/assessment to be navigated, potentially working towards domain mastery and perhaps even a path towards a profession to be pursued. The second step is to trace back from this point to psychological theory that can inform us about students' coping strategies. This theory must be substantive and comprehensive to (at the very least) position and thereby allow these motivated strategy models to share common space. It is the proposal of the current integrative review that perceived control (Connell 1985; Skinner 1995, 2017), arising from a need for competence (White 1959), is well positioned to provide exactly this type of organisation for future motivated strategy research.

Need for Competence and Perceived Control

The meta-theory "need for competence" provides common, fertile ground for discussing what motivated learning strategies are and what they share, focused as they are on enhancing competence. What is commonly referred to as a need for competence arose out of a wealth of empirical findings reviewed and brought to a fine point by White's review "motivation reconsidered" (White 1959). The position of the need for competence as an innate need (for an excellent review of this position, see Skinner 1995) marks a major headwater (origin) for the rivers and streams of motivated learning strategies.

Many theories of motivation arise from the implications of an innate need for competence such as self-efficacy (Bandura 1997), attribution theory (Weiner 1985), locus of control (Rotter 1966), perceived control (Skinner 1995) and self-determination theory (Deci and Ryan 1985) (for an exhaustive guide to control related constructs, see Skinner 1996). These theories of human motivation are tightly related, each focused, in part, on the direct or related implications of the psychological need for competence. Perceived control (internal-external-lack of control) "exerts its effects through motivational, emotional, cognitive, volitional and neurophysiological mechanisms" (Skinner 2017, p. 311), which mediate and moderate quantity and quality of students' engagement. Simplistically put, greater internal perceived control in many learning context results in more and potentially higher-quality engagement, which has implications for the broader learning experience.

For the purposes of the current integrative review, which seeks to support convergence among motivated learning strategies, perceived control (as modelled originally by Skinner et al. 1990) is pursued as a potential bridging theory for organising our understanding of motivated strategies. The utility of this particular theory arises partly from the manner in which it situates students' perceptions of control as fitting into the sequence of physical and intra-psychic events (Fig. 2) that lead up to engagements (the use of a motivated strategy; i.e. what individuals are motivated to actually do).

There are at least three ways in which the precise sequencing presented by perceived control theory supports the linkages presented in a 3P organisation of motivated learning strategies. First, perceived control is an important mediator for how students experience instruction (and the learning environment more generally), specifically structure within the instruction. Generally speaking, learning environments that provide students with opportunities to meet their need for competence also enhance students' perceived control (Connell and Wellborn 1991). Structure specifically is defined as "the extent to which social and physical

contexts provide individuals with both information about the pathways to achieving desired and avoiding undesired outcomes and support and guidance for following those pathways" (Skinner et al. 1998, p. 20). Contingency is an important part of how structure supports competency through perceived control. Contingency describes both social interaction and the supply of necessary materials contingently with students' development as learners. In addition to structure, Skinner and colleagues suggest that "appropriate warmth", referred to as involvement, is also an important source of support for perceived control, however, less important for older students (Skinner et al. 1998). As a result, and the limitations of space, this dimension of the learning experience will not be reviewed or modelled here.

Consistent with longstanding SAL theory, which has focused on the role of the learning environment within student learning (e.g. Entwistle and Ramsden 1983), it is the students' perceptions of the learning environment rather than the learning environment itself that is central. Different, however, is that the use of perceived control isolates how the learning environment has a mediated effect on students' motivational and cognitive processes.

Second, the clear role of perceived control within these sequential and reciprocal learning experiences (Fig. 2) supports a better understanding of the 3P arrangement. By situating motivation and coping between perceived control and engagement, it provides theoretical justification for the sequential order of these experiences. Finally, this sequence indicates an intra-psychic reciprocal relationship that connects the 3-Ps and can be tested through lagged modelling or quasi-experimental modelling.

The third level of support that perceived control lends is the clear continuum of control perceptions (lack, external and self; Connell 1985; Skinner et al. 2010). This established continuum is a helpful framework for situating relevant elements of the learning environment, student motivation and strategies (engagement) within a shared, relational space.

The following sections first present and review the 3P as it pertains to the motivated learning strategies, which are the sole topic of this integrative review. At a second stage, perceived control and structure are superimposed on this horizontal system's organisation of this learning model. The objective of this addition is to align key 3P constructs across a shared continuum, thereby supporting future hypothesis generation and potential model integration. By model integration, we mean explicating the concrete overlaps of core and related constructs, supporting motivated learning strategy models in being informed by each other's unique differences and finally supporting motivated learning strategy models in learning from findings based on research with other motivated learning strategy models. Following the presentation of the model, each construct and its positioning are reviewed.

3P Model and Perceived Control Organisation

The 3P model's power arises from its systems perspective on the complex landscape of teaching and learning. The 3P model can be used to model a wide range of teaching components, in a sort of "plug and play" manner. In the context of the current review, we are focusing on motivated strategies (metacognition and cognition) and their key competency development-related correlates. These are correlates that students bring with them to the environment (e.g. prior knowledge which feeds into perceived control), the structuring that they experience from the learning environment (workload, assessment, course goals and quality of teaching) and those that students experience partly as a result of perceived control (e.g. task-related goals and interest) or are a related control construct (i.e. self-efficacy).

Finally, we are also interested in a range of key outcomes such as achievement and generic skills, and also lifelong learning skills/inclination (see Fig. 4).

In the current motivated learning strategy-centred review, perceived control is examined as a potential second layer of lateral organisation for the horizontal reciprocal sequencing of presage, process and product within the 3P model (Fig. 4). What the organisation affords is a common measure for understanding how increases or decreases in one part of the model might be reflected in changes across the 3Ps (predominantly left to right) and why, i.e. presage to process to product (and reciprocally) through shared (often mediated) relations with perceived control. In addition to suggesting theoretical direction for mediated effects across the 3Ps (Figs. 2 and 3), perceived control theory offers common ground for similar constructs/models to cohabit and be tested for their relative effects and inter-relationships (Fig. 4). Figure 4 is described from left to right, beginning with prior knowledge.

Prior Knowledge Students Bring to Their Learning

Prior knowledge, in its many forms, is often the most important presage variable in educational contexts. Prior content knowledge is inextricably connected to prior achievement which together are key for self-efficacy (Bandura 1997), mastery goals (Dweck and Leggett 1988) and interest (Hidi 1990; Hidi and Renninger 2006; Renninger and Hidi 2011). Furthermore, Model of Domain Learning (MDL; Alexander 2003; Dinsmore and Alexander 2012) situates prior knowledge in a specific discipline as an essential determinant of the cognitive processing that an individual can bring to bear. Similar theorising was undertaken regarding the role of prior knowledge within the application of SRL skills (Pressley 1995). Within European research, the role of prior knowledge within students' approaches to learning has also been discussed and tested (e.g. Entwistle 1981; Diseth 2007; Ramsden 1985), indicating its importance across motivated strategy models internationally. It is therefore particularly relevant that prior knowledge (or students' evaluation of it) is at the heart of perceptions of control; it is perhaps the most important determinant of perceived control. At least a portion of the effect of prior knowledge on the presage and process variables discussed can be hypothesised as being mediated by perceived control.

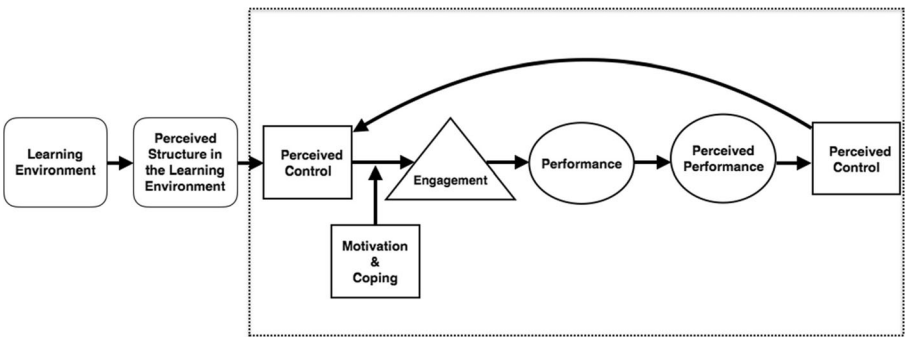

Fig. 2 Control belief, action, performance, attribution and control belief model. The portion within the *dotted box* is directly adapted from Skinner (1995). The structure-related components are added to clarify the role of learning environment within the model

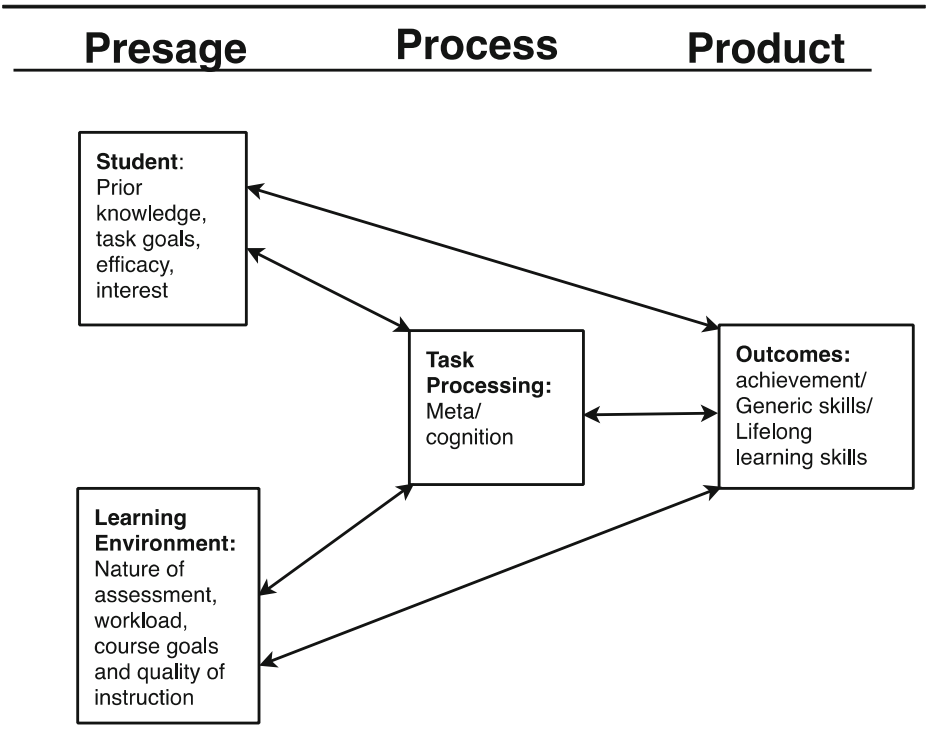

Fig. 3 3P model constrained to the components clearly related to perceived control and the current integrative review of motivated learning strategies. Adapted from Biggs (1993)

Presage Learning Environment Experiences of Structure

The four learning environment variables included in Figs. 2 and 3 have a substantial history with surface and deep processing as modelled within SAL. These aspects of the learning environment arose from interviews with students discussing departmental learning (Entwistle and Ramsden 1983) and are not generally accounted for by many other models of motivated learning strategies. This body of work has aimed to describe and then model the relationship between the learning environment and students' approaches to learning. Rarely, however, has the field of SAL reached for psychological theory to connect with the well-documented relationship between the two. Perceived control has the potential to provide some theoretical support to a considerable history of bottom-up (interview-based) research in this area. Doing so might further empower both tests, even manipulations of these qualitatively evident connections. Each of the four learning environment variables modelled included in Figs. 2 and 3 can be understood, at least in part, as structure which contributes to students' sense of perceived control. Course goals and good teaching are two positive aspects of the learning environment which structure and support learning across course experiences. For example, course goals make it clear to the student the pathways to success. Good teaching provides consistent psychological and physical structure to learning experiences through clearly organised materials which are levelled appropriately, as well as sufficient written and spoken feedback about progress. These all fit within structure which supports students' perceived control over their domain learning. On the other side of the student experience, insufficiently

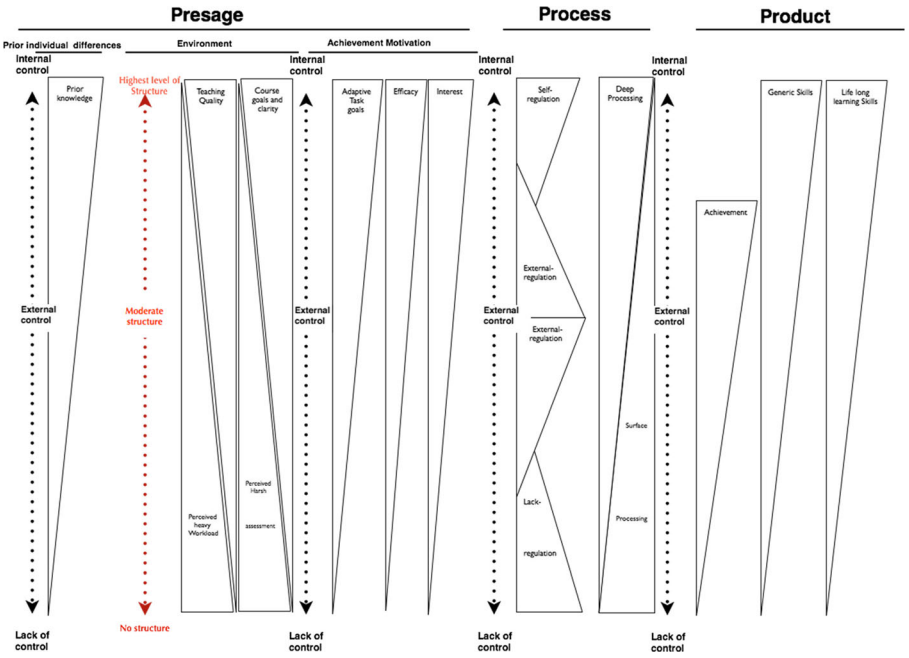

Fig. 4 3P model organised across students' perceptions of control. (1) The *triangles* indicate more or less of the construct, in concert with more or less perceived control experienced by the student. (2) Consistent with the original 3P model Fig. 1, strong predictive effects are hypothesised *left* to *right* with smaller reciprocal effects also hypothesised. Consistent with Fig. 1, adapted from Skinner (1995), the bulk of the reciprocal effects are expected to be mediated through performance evaluations and subsequent perceived control

contingent assessment and unreasonable demands (as perceived by students) can weaken students' perceptions of control over their studies. Unclear contingency of assessment fails to reward hard work. Demanding more work than students feel capable of can similarly undercut perceived control by suggesting that students are not capable of the work.

Presage Motivation (Self-Efficacy, Interest, Goals)

The motivation that students experience is hypothesised as being an important mediator of perceived control. A substantial literature has worked to address the kinds of achievement goals that arise from a need for competence. The field has moved from relatively broad to an increasing refined understanding of task goals during the past four decades (Dweck 1986; Elliot et al. 2011; Elliott and Dweck 1988). While considerable debate has surrounded the benefit of different goal types and their combined use, the importance of mastery goals (learning for learning's sake) has remained at the heart of the discussion (Brophy 2005). Early research examining classroom structures suggested that a clearly structured environment and perceived control specifically were conducive to the development and pursuit of mastery goals (Brophy 1982; Malone and Lepper 1987).

In contrast with the mastery goals that students pursue, self-efficacy has a far more complex, clearly reciprocal relationship with perceived control. A sense of self-efficacy, depending on your theoretical perspective, plays a substantial role within the perceived control experienced by an individual (e.g. Bandura 1989) and is a part of a body of control constructs

(see Skinner 1996) along with mastery experiences (Harter 1978) which each arise from the meta-theory need for competence".

The final motivation to be discussed for the examination of motivated learning strategies is interest. Interest modelled both as a developmental theory (Hidi and Renninger 2006; Renninger and Hidi 2011) or as an essential correlate of processing depth (Alexander 2003) is bound up tightly with perceived control through students' growing knowledge in a specific domain. MDL provides perhaps the most coherent conceptualisation of the necessity of their paired growth over time: increasing domain knowledge increases perceived control which in turn increases processing depth at least partially mediated by an individual's increasing interest in the domain.

Study Learning/Process

The MDL and the SAL model of processing both present themselves clearly across a continuum of perceived control (i.e. higher internal perceived control, deeper learning; more external and eventually lack of perceived control, increasing surface learning), but for quite different reasons. MDL hypothesises that depth of processing in a specific domain increases with discipline knowledge and therefore perceived control in a specific area of study. SAL has two levels of understanding: (a) depth of processing is directly connected to intention which can be manipulated at the task level by depth of assessment (Marton and Säljö 1976a, b) and (b) the overall quality (structure) of the learning environment is related to the depth of processing that students undertake towards course materials (Entwistle and Ramsden 1983). Both the task and course/departmental-level relationships reflect the role that learning environment structure plays on perceived control and the resulting strategies that students undertake to reach what students see as the achievable/practicable outcomes that the environment presents (Skinner et al. 2010).

Turning our attention to SRL models, SRL is often framed loosely as a constructive process through which students proactively monitor, control and regulate their thoughts, feelings and behaviours to reach personal learning goals (Zusho this issue; Pintrich and Zusho 2007). At the task/event (e.g. Vohs et al. 2014) and pattern (e.g. Vermunt 2005) level, SRL can be very different in focus (both ends of the grain size continuum). Extensive research, particularly from a social cognitive theory perspective (e.g. Schunk 2001; Schunk and Zimmerman 1997; Zimmerman 1990, 1995, 2008), has examined the role of control-related variables within SRL (e.g. Abraham et al. 1998; Babin and Darden 1995; Bagozzi 1992; Burnette et al. 2013). It is important to note that SRL at this level is in fact a number of strategies regulating many aspects of the learning process: e.g. metacognition, motivation and effort. Perceived control has been hypothesised as being fundamental, particularly in the initiation and then mediated by motivation, supporting persistence and subsequent initiation.

At the pattern level, as researched by Vermunt and colleagues, scant studies have been undertaken to examine the role of either prior knowledge, competency perceptions or any of the variables that fall under the broad umbrella of perceived control. However, based on the content of the inventory's regulation scale items, some items are clearly control related (see Vermunt and Donche this issue) specifically, items that focus on how a student judges whether or not he or she has studied enough and/or what he or she should study (e.g. based on the teacher, textbook or self judgement). It seems reasonable therefore to suggest that Vermunt's self-external-lack of regulation would also correspond roughly with experiences of self, external and lack of perceived control.

Finally, at the product P-stage (e.g. achievement, generic skills, inclination for lifelong learning), the continuum of perceived control orients development in each of these areas as enhanced competency is directly related to enhanced perceptions of control. In addition, perceived control theory suggests how these outcomes might reciprocally support students' future use of motivated learning strategies (Fig. 2).

Theoretical Implications

Theoretical frameworks are important tools for the organisation of ideas and suggest direction for the generation of testable hypotheses. The proposed framework presented here is meant to present one means of supporting research in the field of motivated learning strategies by providing a common framework for discussing a broad range of strategies and their presage variables together. Just as all human beings share a common innate need for competence, the motivated learning strategies that students utilise to meet this need are—partially mediated by perceived control—affected by prior knowledge, structure experienced from the environment and (reciprocally) students' learning outcomes.

One avenue that this common framework might open up for future research is the integration of overlapping ideas and sharing of unique aspects. The learning environment is a key presage variable that might be integrated under the common idea of structure and its implications for processing as suggested by perceived control theory. Furthermore, in this manner, what we have learned from context-embedded SAL research might be applied at least in part to processing strategies within other models such as the MDL and SRL. A second area of potential development might be our processing dichotomies (e.g. elaboration/memorisation) and models (e.g. SAL and MDL) of processing which do not in fact compete. However, separated as they are into North American/European closeted research programs, these models have failed to seek, let alone find, common ground. As coping strategies, each arising from different elements of the learning experience, perceived control might just provide enough shared space for discussion and integrative efforts. A third area of integration might be the levels of examination/measurement (event, task and pattern), which might also be connected based on their shared relationship with a structuring and directing principle such as perceived control. Finally, perceived control might support our motivated learning strategy models in beginning to face the implicit (M. Richardson et al. 2012) and direct (e.g. Coffield et al. 2004) criticism regarding their often relatively weaken predictive power for achievement. Due to perceived control's orientation towards the positive feedback of achievement and the increased confidence that competence attributes, perceived control might support hypothesis development directed more specifically at these important observed outcomes.

In addition to connecting our distinct (but also overlapping) models of studying/learning strategies within HE, a common measure of perceived control also connects this archipelago of research islands with the broader realm of educational psychology and psychology generally. By understanding the significant role that perceived control can play within motivated strategy models, there is the potential to learn from studies in a broader range of contexts, cultures and age groups. The face of HE is changing. A much wider population, both in age and culture, is participating and will continue to challenge the ideas that we have developed from research with twentieth-century university students. Furthermore, the role that HE might play within lifelong learning has yet to be defined but is a question we as educators and researchers must begin to address.

It is the proposition of the current integrative theoretical review that through the connective theory of perceived control, researchers might find the means of connecting, comparing, sharing, reshaping and thereby reenergising their research into why HE students learn and how we might support them best in this endeavour.

Other Macro-Theories

It is essential to acknowledge that macro-theories other than perceived control might (have) play(ed) a similar role in stimulating new questions and organising our understanding of motivated learning strategies. For example, self-determination theory (SDT; Deci and Ryan 1985) proposes that humans have an innate need for autonomy (in addition to relatedness and competence). Based on this need, SDT's mini-theory (organismic integration theory) proposes a continuum of regulated motivation across an impersonal, external and internal locus of perceived causality. This continuum is in many ways a (congenital) twin to the continuum of perceived control. It focuses on value (rather than competence), the regulation (not to be confused with SRL, the learning strategy discussed previously) of which is a key mediator for many of the motivated strategy elements left out of the current discussion: i.e. value and related constructs. The current integrative review focused on the potential role of perceived control over locus of causality chiefly because the former is focused on competency development and secondly due to its clear sequential and reciprocal model for the interaction between key learning strategy components and outcomes.

While both theory and evidence from studies in the field of motivated strategies (e.g. Donche et al. 2013; Fryer et al. 2014) suggest that SDT's continuum of motivated regulation might also be of significant utility, there are a few reasons why the full SDT macro-theory might not be appropriate for the kind of integration pursued here for motivated learning strategy models. First, SDT stands upon some theoretical assertions which not all researchers agree with: e.g. the existence of three specific fundamental needs, issues regarding the supremacy of one high internally regulated goal over multiple goals of various levels of regulation and questions regarding the overlap between intrinsic and achievement motivation. Second, SDT is focused on need satisfaction and the quality of (value-centred rather than competence-centred) motivation. Competence development and its related motivations, while included as one of SDT's psychological needs, are not at the heart of its model. In contrast, perceived control theory integrates competence as an essential outcome and (reciprocally) as a predictor of future perceived control, thereby feeding back into how students engage with learning (Fig. 2). Competence development and its related motivations are at the core of motivated strategies: an essential predictor and their sole objective.

Expectancy-value theory (EVT; Wigfield and Eccles 2000; Eccles et al. 1983), given its considerable history and inclusion of both value- and competence-related motivations, might also be a useful theory for the kind of integrative discussion undertaken here. For very different reasons, but similar to SDT, EVT is not well disposed as an organising theory for motivated learning strategies. The chief reasons are that while it is a complex and comprehensive model of motivation, it is not built on a clear psychological continuum, which might also support further organisation of HE motivated learning strategies. Second, it is not a competence-centred model but is instead focused on achievement-related choices. Furthermore, while the full EVT model (see Wigfield and Eccles 2000) is certainly a comprehensive perspective on the relationships between many essential learning components, its use is more likely to complicate rather than simplify our understanding of student learning during HE.

Limitations and Future Directions

The limitations for any attempt to discuss steps towards the integration a number of distinct research models are too many to count. One limitation is the fact that any such discussion can only meaningfully pursue one specific path towards future integration. Any such attempt naturally fails to address the potential contribution of many other paths, which may lead to similar ends. As perceived control was pursued as a potential point of integration, only relevant constructs that were clearly in alignment with this theory were selected for discussion. This approach meant excluding many important individual differences and some aspects of the learning environment. Examples of key exclusions are sources of motivation with a value valency and components of the learning environment such as emphasis on independence or teacher-student rapport (i.e. aspects of good teaching). As a result, the current framework lacks explanatory power for the role of value within students' motivated strategies and the related and important role of autonomy support and involvement in our learning environments. Future extensions to this framework should consider how autonomy support and involvement might also be addressed.

Finally, as with any theoretical framework, the ideas presented need to be tested. The role of perceived control should be tested both by longitudinal research in natural settings and experimental studies, if we are to properly understand its potential implications for organising and connecting our understanding of motivated strategies.

Conclusions

What has been presented and discussed are only the initial steps towards one potential means of organising our HE motivated learning strategy models. Like any theoretical work, it is only as good as the use researchers actually get from it as a structuring and hypothesis-generating tool. As a minimum, one conclusion that might be drawn from the current effort at integration is that a robust theory like perceived control might be used to thread together overlapping models such as those discussed here. Another conclusion might be that there is still a great deal of theoretical and then empirical work left to be done in this field. This is work that would be supported by better communication between research groups working exclusively with one of the related motivated learning strategy models. One can only hope that consistent with the spirit of systems theory, the present theoretical intervention has provided a small push for the field of motivated learning strategies down the path of "tending toward greater integration" in the not-so-distant future.

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