

# **Business Education and the Constructivist Teaching Debate**

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*The Harvard Case Method has been used in business education, since the 1920s and the use of other constructivist teaching methods, based around realistic problems and projects, has been increasing. But, in a provocative article, Kirschner et al (2006) claimed that constructivist teaching methods, based on cases, problems or projects, had failed and direct instruction should be regarded as the best method of teaching. This sparked the constructivist teaching debate which raged for two years within the journals and conferences of educational psychology. The debate was soon resolved among educational psychologists (Tobias & Duffy, 2009), but the exaggerated initial claims are still being used by some business educators to challenge the increasing use of constructivist teaching methods in universities. The implications of this debate for business education must be informed by the evidence on both sides, rather than by sweeping rhetorical claims. This paper outlines the main issues at stake in the constructivist teaching debate and discusses the implications for business education by drawing on relevant research from across the wider discipline of educational psychology.*

**JEL Codes:** I21, I23

## **1. Introduction**

### **1.1 Constructivist Teaching Methods in Business Education**

The use of cases for teaching is a long-standing tradition within business education. The Harvard Case Method, for example, has been in use since the 1920s. In more recent decades, the use of realistic, management consulting-style projects has also increased. Cases and projects are intended to present learners with realistic situations, characterised by complexity and some degree of ambiguity. But there remains some confusion about their purpose: Are they intended to help novice learners to learn fundamental business concepts and techniques or are they intended to help more advanced learners take what they have already learned and apply it to complex realistic problems?

Educational psychologists, for better or worse, have come to refer to case-based, project-based and problem-based teaching methods, including Problem-Based Learning in medical education (Barrows & Tamblyn, 1980; Barrows, 1985, 1986), as *constructivist teaching methods*. The most common feature of these teaching methods is that they present students with complex (and sometimes deliberately ambiguous) learning stimuli. As students puzzle through these stimuli, in search of a solution or in pursuit of an objective, they are thought to gain a deeper understanding of how disciplinary principles can be applied in complex, realistic situations.

### **1.2 The Constructivist Teaching Debate**

One of the more intense debates in educational psychology, over the last decade, has focused on the amount and type of guidance that is appropriate for learning in educational settings. The debate was initiated by three Cognitive Load Theorists, in a provocatively-titled article, *Why minimal guidance during instruction does not work:*

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*An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching* (Kirschner, Sweller & Clark, 2006). In this article, the authors presented evidence to support their claim that *direct instruction* using worked examples (ie. fully instructor-directed learning) is more effective than *unguided discovery learning* (ie. fully self-directed learning) on time-limited learning tasks, conducted under lab conditions. Most educational psychologists would agree with the article's main title that minimal guidance is not a feature of effective instruction. More controversially, the authors extrapolated from their limited lab studies to claim that all constructivist teaching methods must be failing because they involve minimal guidance of student learning. This assertion, reflected in the article's subtitle provoked a brief, but intense, storm of controversy known as the 'constructivist teaching debate' (Tobias & Duffy, 2009).

The article's many opponents pointed out that it had completely misrepresented constructivist teaching methods as being unguided. They claimed that most constructivist teaching methods include extensive guidance (Hmelo-Silver, Duncan & Chinn, 2007; Kuhn, 2007). They claimed that the unguided discovery learning tasks which the authors had used in their lab studies as their example of a 'constructivist teaching method' were, in fact, not teaching methods at all. Rather, they simply allowed novice learners, with no relevant prior knowledge, to play freely with materials (eg. wires and magnets), without guidance, to see whether they could independently rediscover important principles (eg. Ohm's Law or Faraday's Law of Induction) which, predictably, they did not. This, claimed the opponents, was not representative of constructivist teaching methods, at all, and particularly not the set of methods listed in the article's subtitle. They pointed out that inquiry-based learning, for example, involves careful selection or design of learning materials by the instructor. The learning environment is usually designed to make the inquiry task easier by excluding materials which are irrelevant or misleading. The process of inquiry – asking sub-questions, selecting lines of investigation, proposing hypotheses, designing experiments, evaluating information, making decisions, exploring relationships – is also carefully guided, either via instructions or questions in the learning materials which scaffold the inquiry process or by a teacher or tutor who actually participates as a co-inquirer.

The constructivist teaching debate, within educational psychology, was soon resolved (Tobias & Duffy, 2009). The near-consensus view was that the original article's title was correct – the authors' experimental results showed that minimal guidance during initial instruction does not work. However, the article's subtitle was regarded as having misrepresented the effectiveness of constructivist teaching methods when they do include guidance or when they are used with learners who have progressed beyond the novice stage. So things might have rested, but for the internet and the vicissitudes of the academic publishing world.

In the years since this debate was settled within the discipline, it has found a second life among higher education practitioners, critics and commentators. Today, Kirschner, Sweller & Clark (2006) is the most widely-read article in *Educational Psychologist* with over 42,000 downloads. Hmelo-Silver, Duncan & Chinn's (2007) rebuttal is the 4<sup>th</sup> most widely read, but with only 7,500 downloads. The first article is a free access article; the others are not. So the original article – now largely discredited – is reaching 5 times more educators than are the articles which successfully rebuffed it. Business education may be particularly susceptible to the effects of unsupported rhetoric attacking constructivist teaching methods, because, apart from the Harvard Case Method, the use of these teaching methods is still

relatively new in business schools. Ten years ago, Hanson & Sinclair (2005) found that constructivist teaching methods were much less prevalent in undergraduate business programs than in other undergraduate programs, within Australia. This situation is changing, but recent changes are still opposed by many critics. The present imbalance in the constructivist teaching debate 'phase 2' fuels the critics' opposition, but it does so with sweeping rhetorical statements which are not supported by evidence and which have already been discredited within their own discipline of educational psychology. This paper will make a modest attempt to clarify the debate, to explain how it was resolved among educational psychologists, including the original authors, and to discuss what that resolution implies for business education.

## **2. Literature Review**

### **2.1 The Constructivist Account of Human Learning**

The constructivist account of learning – now widely accepted, in one form or another (Bransford, Brown & Cocking, 2000; Greeno, Collins & Resnick, 1996; Mayer, 2009) – is that learners construct new knowledge from the interaction of their prior knowledge and their current experiences. Learners have to be intellectually active to do this – that is, they have to think hard about how to reconcile current experience with prior beliefs. Learners also have to have experiences to think about. Furthermore, if learners learn by constructing knowledge for themselves, there is always the possibility that they will construct misconceptions. Many educators in colleges and schools will be familiar with terms such as intrinsic motivation, student engagement, deep learning versus surface learning. These concepts are all important within the constructivist account of learning. Other uses of the term 'constructivism', in philosophy, anthropology or sociology have no necessary relationship with the constructivist account of learning, which is based on psychological constructivism. The claim that people have to construct their own cognitive structures (personal theories, mental models, internal explanations, etc.) to represent the world, says nothing about the nature of the world, itself.

One of the founding figures in contemporary educational and developmental psychology, Jean Piaget, termed the constructivist learning process *equilibration* (Piaget, 1975). Perceived inconsistency between current experience and prior beliefs creates cognitive disequilibrium and the learner, if sufficiently motivated and engaged, attempts to restore equilibrium in one of two ways: *assimilation* which involves interpreting current experience to fit within existing knowledge structures, or *accommodation* which involves extension or modification of existing knowledge structures (ie prior beliefs) to accommodate current experience. But learners may choose not to do this and, instead, just ignore or live with the inconsistencies between beliefs and experiences. A failure to learn may be ascribed by constructivists to insufficient intellectual engagement with experiences that challenge their naïve prior beliefs. The constructivist account of learning depends on intellectual effort, which means that motivating learners to engage intellectually is crucially important.

Although there is broad acceptance of the constructivist account of learning, as just presented in fairly abstract terms, there is disagreement about what kinds of educational experiences are most conducive to learning. Conducting an experiment is an experience, but so is reading a textbook or listening to a lecture. Any one of these experiences might challenge a learner's prior beliefs and create the cognitive

disequilibrium that will motivate an engaged student to learn. There is also disagreement about how to encourage learners to be intellectually-active in pursuit of equilibration: Does equilibration happen automatically or does the learner have to be motivated and/or guided? Is equilibration best achieved individually, as an internal mental process, or socially via discussion and debate with others? Some constructivists have derived general answers to these questions from the works of earlier theorists and formed camps within constructivism: radical constructivists, Deweyans, Piagetians, social constructivists, Vygotskians, and so on. Others regard these as empirical questions, still awaiting answers which might turn out to be generally applicable or context dependent.

## **2.2 The Key Question Raised by the Constructivist Teaching Debate**

Although its provocative initial claims were quickly countered and debunked, the constructivist teaching debate did raise some important questions which had, perhaps, been overlooked for too long. The experimental results of the original article's authors could not be dismissed. In essence, they had shown that novices in a subject learn more effectively when they study solved problems (worked examples) than when they are presented with problems to solve for themselves. This finding was robust, since it had been replicated across a number of well-structured domains, such as mathematics and introductory physics. Their rhetorical extrapolation of this finding was unfounded, since their evidence related only to absolute novices learning in well-structured domains. But the findings, themselves, did raise an important question which many constructivists had regarded, prematurely, as settled: (1) What types of learning tasks are most effective for learners with *different* degrees of prior knowledge?

### **2.2.1 What Types of Learning Tasks are Most Effective for Learners with Different Degrees of Prior Knowledge?**

Psychological constructivism is a theory of human learning and knowing, not a theory of teaching (Mayer, 2009), but it does have implications for the design of education programs. The effects of all teaching methods (and independent learning) can be explained by the constructivist account of learning, but one group of teaching methods has become more closely associated than most with psychological constructivism – those methods based on problem solving and inquiry. In the constructivist account, learning requires sustained mental effort. Learners have to be exposed to experiences that challenge their preconceptions and they have to engage intellectually to resolve the cognitive disequilibrium that these experiences create. If learners are to really understand Newtonian physics, for example, they need to do much more than simply read a textbook, memorize formulas and answer the questions at the end of the chapter. They need to think deeply about Newtonian physics when they are driving a car, riding in an elevator, throwing a ball, and so on. Students who do not think deeply, in this way, often maintain two mental theories of physics – Newton's 3 Laws of Motion, which they use to answer textbook problems or test questions and a naïve pre-Newtonian (Aristotelian) model which they use to explain everything else. Most constructivists see student intellectual engagement as the key challenge for effective teaching. Some students can be extrinsically motivated to engage (eg. because they are sufficiently motivated to achieve higher test scores than their peers, regardless of the topic), but some cannot. All students can be motivated to engage, however, if the topic or the learning activities are sufficiently *interesting* to them. So teaching methods that try to make learning more interesting for learners tend to be those most favored by constructivists. But

engaging students' interest is just the first step. The next step is to *guide* them as they try to resolve their cognitive disequilibrium – to help them explain what they have experienced, using the theoretical concepts and methods (eg. Newton's 3 Laws of Motion) of the topic they are learning (eg. Newtonian physics).

The importance of engaging learners and motivating them to apply mental effort can tempt educators into presenting students with interesting, real-world problems and challenges at the very beginning of the learning process. Certainly, this can be a very motivating way to begin. However, the constructivist account of learning also requires learners to have some prior knowledge that is relevant to the problem. This presents a difficulty for absolute novices in a domain, if they have no relevant prior knowledge or if they are unable to recognize which aspects of their prior knowledge might be relevant. The teaching method favored by the Cognitive Load Theorists presents novices with worked examples showing students how basic problems are solved in the domain and illustrating some of the domain's fundamental findings (eg. Ohm's Law or Newton's 3 Laws of Motion). Their experiments have shown that, for absolute novices, learning by studying solved problems (the worked example approach) is more effective than learning by trying to solve problems (the 'constructivist' approach). Their explanation for this finding is that knowledge is stored in long-term memory, but the construction of knowledge occurs in working memory, which has a limited capacity, so limiting the cognitive load on working memory is an important consideration in designing instruction (Sweller, 1988). Realistic problems may be more interesting, but they are also more complex and their complexity presents a learner with excess cognitive load, making knowledge construction in working memory more difficult. However, their studies have also found that, once a student has learned the basics, the results are reversed – intermediate students learn more effectively by solving problems than by continuing to study solved problems. They have called this the *expertise reversal effect* (Kalyuga, Ayres, Chandler & Sweller, 2003), but far from requiring 'expertise', as usually defined, it has been shown to occur once novices have had as little as 2 hours of instruction via worked examples. This finding is entirely consistent with the constructivist account of learning which is based on the ongoing mental reconciliation of current experience and prior knowledge. The initial provision of some relevant prior knowledge can help to 'bootstrap' the knowledge construction process.

The key question raised by the constructivist teaching debate was: What types of learning tasks are most effective for learners with different degrees of prior knowledge? From a balanced survey of the experimental evidence, the answer appears to be that highly-structured tasks of limited complexity are best for introducing the basics of a domain to absolute novices, but the value of these tasks depreciates quickly, once learners have constructed the basic building blocks of domain knowledge in long-term memory. This may be because these tasks are not particularly engaging and cannot motivate learners to invest mental effort for very long. At this point, the *expertise reversal effect* sets in and constructivist teaching methods become more effective. This was how the debate was resolved, in an edited book (Tobias & Duffy, 2009), among educational psychologists, including the original authors.

In business education, this means that the Harvard Case Method would not be a suitable teaching method for first-year economics or accounting or statistics courses, in an undergraduate program. It is, however, one of several suitable constructivist teaching methods (along with projects or PBL) available for intermediate or

advanced undergraduate courses or for MBA programs with students who have prior degrees and some years of business or management experience. Prior knowledge makes a big difference, as the *expertise reversal effect* demonstrates.

## **2.2 The Key Question Missed by the Constructivist Teaching Debate**

The entire constructivist teaching debate was focused on the single educational objective of improving a student's theoretical knowledge. Ten years ago, Hanson & Sinclair (2005) found that Australian business academics regarded theoretical knowledge as being the main learning objective of their programs, but that may no longer be the case. External stakeholders have been pressing business educators to broaden their focus to include additional learning objectives such as positive attitudes towards diversity, sustainability and ethics, skills in written and oral communication, teamwork, critical thinking and, above all, research & inquiry – even creativity. These external stakeholders have included employers of business graduates, governments and accreditation agencies, such as AACSB and EQUIS, all of whom have considerable power to influence business schools. Employers have the power to employ, or not to employ, a school's graduates, thus affecting the school's reputation and ability to attract future students. Governments have the power to increase or decrease funding to particular universities, based on compliance with national curriculum standards, such as the AQF in Australia. Accreditation agencies have the power to grant or withdraw a school's international accreditation – a key component in a business school's reputation and ability to attract academics and students.

Business schools ignore this broadening of learning objectives at their peril, and this raises a second question, which has not yet been addressed in the constructivist teaching debate: *For which learning outcomes are constructivist teaching methods best suited?*

Only by answering this second question, can we fully appreciate the implications of the constructivist teaching debate for business education. This will be the focus of the remainder of this paper.

## **3. Methodology**

Employing empirical methods, such as experiments or surveys, to address this question could create work for a whole generation of enthusiastic business educators who have not studied educational psychology in any great depth – and perhaps it will. But over 100 years' worth of relevant empirical and theoretical work has already been done by educational psychologists who have conducted studies in secondary education, adult education, professional education & training and, above all, in other disciplines within higher education – especially medical education. The results of this century of work can, here, be applied to yield well-supported answers to the question.

Today, educational psychology is based upon a triarchic framework of paradigms, which have been developed from a century of experimental and theoretical work. In the *Handbook of Educational Psychology*, Greeno, Collins & Resnick (1996) labelled them: the Behaviorist/Empiricist paradigm, (2) the Cognitivist/Rationalist paradigm, and (b) the Situative/Pragmatic-Sociohistorical paradigm. They argued that, despite turf wars and competition for resources, among theorists, the three paradigms actually complement one another, in application, and should be regarded as forming

a single, overarching, triarchic framework. When applied to the understanding of cognition, motivation or learning, each paradigm raises questions and offers insights that would be almost inconceivable from the others. Rarely, if ever, do they yield conflicting hypotheses or genuinely-conflicting practical recommendations, which is why all three still exist. The triarchic framework is now well established and it represents the core of the discipline (Bransford, Brown & Cocking, 2000; Bransford et al., 2006).

This paper will proceed via an integrative theoretical analysis which maps the three paradigms from educational psychology's triarchic framework on to the main potential learning outcomes of business education. It will then draw upon the author's previous research to show where and how constructivist teaching methods can best contribute to meeting the main learning outcomes of business education.

## **4. Analysis & Discussion**

### **4.1 Framing Paradigms**

The *Behaviorist/Empiricist* paradigm, which includes associationism, neobehaviorism and connectionism (ie. neural networks), focuses on the strengthening or weakening of associations within the organism. Behavioral learning (eg. skill development) is viewed as the strengthening of stimulus-response associations shaped by external rewards. Skills are developed via continuous practice with feedback. This paradigm is particularly useful in studying the development of an individual's skills in performing routine tasks.

The *Cognitive/Rationalist* paradigm, which includes Gestalt psychology, symbolic information processing and cognitive-constructivism, focuses on knowledge structures (eg. schemata, scripts, mental models) in the mind of the learner. Cognitive learning is regarded as the construction of those mental knowledge structures and their on-going refinement in reasoning, problem solving and decision making tasks. Effective learning is the construction of mental schemata which accurately reflect the theories and concepts being taught. This paradigm is particularly useful in studying an individual's understanding of concepts and theories.

The *Situative/Pragmatist-Sociohistoric* paradigm, which includes Deweyian and Vygotskian social-constructivism, cultural-historical activity theory and communities of practice, focuses on the learner's interaction with its environment or the learner's participation in social and technological systems. Learning is regarded as becoming attuned to the constraints and affordances (ie. opportunities for action) of these systems. Effective learning makes the learner an effective operator within those systems or a more effective participant in a community of practice or inquiry. This paradigm is particularly useful in studying the learner's development of capabilities, dispositions and other more holistic and socially-defined characteristics (eg. competence or creativity), which combine knowledge, skills, attitudes and values.

Constructivist teaching methods were developed originally from the perspective of the second paradigm. They were developed to help learners construct better understanding of theories and concepts being taught in education programs. Although, the constructivist teaching debate challenged the effectiveness of these methods in actually achieving this learning outcome. As explained earlier, that challenge was successful in relation to novice learners, but unsuccessful in relation to intermediate and advanced learners.

However, when viewed from the first and third paradigms, constructivist teaching methods have the potential to do much more than this. Although they are commonly labelled 'constructivist' teaching methods, the Harvard Case Method, Problem-Based Learning and other similar techniques can equally be regarded as 'Neobehaviorist' teaching methods or 'Situative/Pragmatist' (ie. practice-oriented) teaching methods.

They are situative/pragmatist teaching methods because they are based upon real problems drawn from professional practice, which students must solve using profession-specific methods of inquiry, developing their effectiveness as 'apprentice' members of their profession. They are also neobehaviorist teaching methods because they offer learners multiple opportunities to use the profession's standard techniques to perform more routine tasks (eg. medical diagnoses, financial analyses) under increasingly realistic conditions, thus developing their professional skills.

The development and improvement of professional skills through repeated practice with feedback is widely understood and the mental construction of conceptual or theoretical knowledge structures has been explained earlier in this paper, but the development of capabilities and dispositions for engaging in professional inquiry, perhaps needs more explanation, here.

#### **4.2 Capabilities and Dispositions for Engaging in Professional Inquiry**

In their day-to-day work lives, professionals encounter a mixture of routine problems, which are familiar within their profession, and non-routine or novel problems, which are not so familiar. Through education, training and daily experience, a professional becomes skilled at solving routine problems and performing routine tasks. But when it comes to novel or non-routine problems, there are no ready-made or well-practiced solutions. The professional must revert to the use of basic principles and systematic methods of inquiry or investigation, appropriate to their profession. A professional will be better able to do this, if he or she has already developed the capabilities and dispositions for engaging in professional inquiry, before entering professional practice. The importance of this learning outcome, within a professional education program, depends upon the relative likelihood that the professional will encounter non-routine versus routine problems and the likely consequences of solving versus not solving those non-routine problems. When compared with doctors, lawyers or engineers, future business managers can be expected to encounter many non-routine problems for which there is no ready-made or well-practiced solution. That is, perhaps, why business school accreditation agencies are placing increasing emphasis on learning outcomes such as problem solving, critical thinking, creativity and inquiry. These characteristics can be developed in education programs – although probably not through lectures. They are, in fact, the principal learning outcomes of any PhD program.

A PhD program engages a student in a supervised research project to develop that student's capability and disposition for conducting independent academic research. We academics develop researchers, according to an apprenticeship model, by getting them to *do* real research, under supervision. 'Capability' is a complicated word, but doing research *is* complicated. It involves a combination of skills in performing research-related tasks and conceptual understanding of the epistemological and methodological principles that underpin the design, judgment and interpretation of research. The disposition to engage in inquiry includes the questioning attitudes and values that drive research activity.

Academic research is but one form of inquiry. Other professionals (business managers, investment bankers, lawyers, doctors, architects, police investigators, intelligence officers) also engage in inquiry or investigation to answer important questions and to solve non-routine problems that occur in the course of their professional practice. Their methods of inquiry have some similarities to academic research, but they are also different in important ways. These are the profession-specific methods of inquiry that new practitioners must master to become fully-fledged members of their profession.

Constructivist teaching methods, such as Problem-Based Learning, can serve to model those profession-specific methods of inquiry. When students are engaged in inquiry- or problem-based learning activities in education they can develop the capabilities and dispositions for engaging in inquiry beyond education, in their professional lives. This is not merely 'learning how to learn', it is learning how to investigate – learning to learn via self-directed inquiry.

The development of capabilities and dispositions for engaging in professional inquiry is achieved via apprenticeship or immersion in real or realistic inquiry (Bereiter, 2002a, 2002b; Bereiter & Scardamalia, 2003; Brown, Collins & Duguid, 1989; Greeno & Goldman, 1998; Greeno & The MMTAP Group, 1997; Wells, 1999, 2000, 2002; Wells & Claxton, 2002). Inquiry begins with a real unfamiliar problem or question, and is motivated by a genuine desire to understand and to solve the problem. The role of the educator is to step in and out of the didactic role, as needed, to take on the role of a co-inquirer and to model an ethos of collaborative inquiry. The educator is also the organiser and leader of the community's activities, who coaches students in their attempts to engage in inquiry. Students learn in a coached, cognitive apprenticeship (Collins, 1991; Collins, Brown & Newman, 1989). The purpose of modelling inquiry in the classroom is to cultivate in students an epistemological and methodological stance that might be characterised as a disposition to engage in systematic inquiry about questions or topics in which one is interested. Inquiry is not just about mastering a body of information – it is also about being open to wondering and puzzlement, and trying to construct and test explanations of the phenomena that evoked these feelings (Wells, 2000). Bereiter (2002b) describes this educational objective as the *enculturation* of students into the practices of a knowledge-building community. Enculturation of students into the practices of a knowledge-building community can be viewed as:

... joining the ranks of those who are familiar with, understand, create, and work with the conceptual artifacts of their culture. ... 'Joining the ranks' means becoming part of the knowledge-producing subculture, identifying with its members, learning their skills, sharing their aims and their norms. (Bereiter, 2002b: p. 229)

Students in a PhD program aspire to join the community of researchers in their discipline and to 'join the ranks', they must master the skills & knowledge and adopt the values that this community regards as important. Students in professional programs aspire to join their intended profession and to join the ranks, they must master the skill and knowledge and adopt the values that are regarded as important in their profession. This includes the profession's norms and techniques of inquiry or investigation. It is not only academics who engage in inquiry.

### 4.3 For which Learning Outcomes are Constructivist Teaching Methods Best Suited?

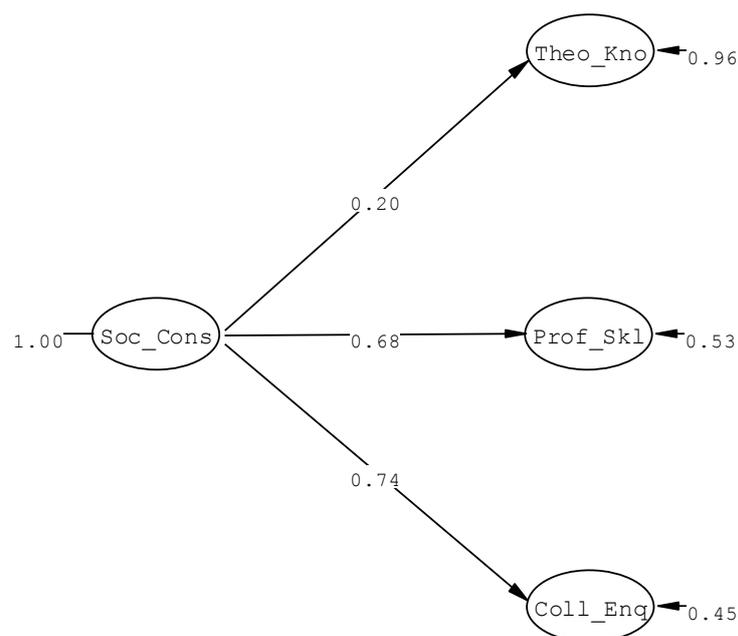
So the triarchic framework of paradigms within educational psychology highlights three sets of learning outcomes which may be developed by constructivist teaching methods. Educational psychologists have found empirical evidence that constructivist teaching methods can be effective in developing all three sets learning outcomes. They can help students to develop a deeper understanding of theoretical knowledge (Barron, Schwartz, Vye, Moore, Petrosino *et al*, 1998; Cognition & Technology Group at Vanderbilt, 1997; O'Donnell & Dansereau, 1992), superior profession-specific skills (Distlehorst & Robbs, 1998) and the capabilities and dispositions for engaging in professional inquiry (Blumberg, 2000).

Hanson (2009) surveyed 277 Australian university academics who were teaching in professional programs which used some at least some constructivist teaching methods. The academics were asked about the extent to which their programs used constructivist teaching methods and were also asked to rate their own graduating students on the 3 sets of learning outcomes discussed in this paper.

Structural equation modelling showed no significant relationship (neither positive nor negative) between reported use of constructivist teaching methods and ratings of students' theoretical knowledge. This was consistent with similar findings that the effect of Problem-Based Learning on medical students' recall of theoretical knowledge was not significantly different from the effect of traditional, didactic teaching methods.

However, there were strong, and highly-significant, positive relationships between reported use of constructivist teaching methods and ratings of students': (i) profession-specific skills and (ii) capabilities for engaging in collaborative inquiry.

**Figure 1: Structural Equation Model (LISREL) from Hanson (2009)**



**Table 1: Tests and Descriptive Fit Indices for the Model in Hanson (2009)**

Fit Indices	CFI	SRMR	$\chi^2_{SB}$	TLI	IFI	GFI	Reject?	
Rejection Rule	<.96	>.080	p<.050	<.90	<.90	<.90		
Hypothesized Model	.98	.072	40.09 df=28	p=.065	.96	.98	.91	No

Structural Equations

Equation: **Theo\_Kno = 0.20\*Soc\_Cons**, Errorvar.= 0.96 , R<sup>2</sup> = 0.039  
 Std Error: (0.13) (0.17)  
 z score: 1.54 5.52  
 p value: p = .12 (not significant)

**Prof\_Skl = 0.68\*Soc\_Cons**, Errorvar.= 0.53 , R<sup>2</sup> = 0.47  
 (0.11) (0.16)  
 6.10 3.31  
 p < .001

**Coll\_Enq = 0.74\*Soc\_Cons**, Errorvar.= 0.45 , R<sup>2</sup> = 0.55  
 (0.13) (0.17)  
 5.57 2.67  
 p < .001

Of course, the data here were subjective assessments of students by the academics who teach them, but the results were consistent with other studies, using other methods (Barron, Schwartz, Vye, Moore, Petrosino *et al*, 1998; Blumberg, 2000; Cognition & Technology Group at Vanderbilt, 1997; Distlehorst & Robbs, 1998; O'Donnell & Dansereau, 1992).

They are also consistent with the predictions of the triarchic framework of paradigms within educational psychology, with one exception: the cognitive/rationalist paradigm's constructivist model would have predicted that greater use of constructivist teaching methods would have a positive effect on students' theoretical knowledge. Yet the challengers to that model, in the constructivist teaching debate, would have predicted a negative effect. The data, in Hanson's (2009) study, showed no significant effect.

The likely effect on students' theoretical knowledge of switching from didactic to constructivist teaching methods is theoretically debatable and, thus far, non-significant in empirical studies.

However, when we turn our attention to the other 2 sets of learning goals – profession-specific skills and capabilities for engaging in professional inquiry – the findings are much more emphatic. The effects on these 2 learning outcomes of switching from didactic to constructivist teaching methods are theoretically well-established and, thus far, unambiguously positive in empirical studies.

## 5. Conclusion

### 5.1 Implications for Business Education

The great promise of constructivist teaching methods is that, with appropriate fine-tuning, they can be used to pursue all three learning outcomes simultaneously. Our best assessment, from theoretical and empirical work in educational psychology, is

that constructivist teaching methods are superior to traditional teaching methods for developing students' profession-specific skills (for addressing routine tasks or problems) and for developing students' capabilities for engaging in professional inquiry (for addressing non-routine problems). Furthermore, they are just as good as traditional methods for developing students' theoretical knowledge, although the constructivist teaching debate should warn us that these methods are not effective for introducing novice learners to a new discipline or domain, for the first time. Direct instruction is the best method for teaching the *basic* theoretical concepts of *well-structured* domains to *novice* learners, but constructivist teaching methods take over once the *expertise reversal effect* sets in.

The implications of the constructivist teaching debate for business education programs depend upon the intended purposes of those programs. In principle, the implication for programs that are focused, primarily, on developing students' theoretical knowledge, is that a curriculum based on all direct instruction will give students the basics but it will not engage many of them to think hard in the sustained way required to develop a deep understanding of what they are learning – some perhaps, but not many. A curriculum based on all inquiry or problem solving activities will be more engaging, but it will probably take longer for novices to learn the basics. A curriculum that begins each topic with direct instruction but transitions toward inquiry and problem solving activities would be most consistent with the findings of educational research and consistent with the agreed resolution of the constructivist teaching debate. However, this all remains to be demonstrated clearly, in practice. Empirically, perhaps the best we can say, at this stage, is that there are no clear implications for students' mastery of theoretical knowledge.

There are clearer implications for business programs that are focused on developing profession-specific skills, as well as theoretical knowledge. Teaching methods such as Problem-Based Learning in Medicine or the Harvard Case Method in Business are not only constructivist teaching methods, designed to develop theoretical understanding – they are also neobehaviorist teaching methods designed to develop professional skills. They might not, on their own, be the best means of pursuing the first learning objective, but they are certainly the most direct, realistic and effective way of pursuing the second. Whether inquiry- and problem-based teaching methods are the best way or only the second-best way of achieving the constructivist goal of theoretical knowledge, they are clearly the best way of developing professional skills (Distlehorst & Robbs, 1998).

There are even stronger implications for programs that are focused on developing students' capabilities and dispositions for engaging in inquiry or research. PhD programs that aim to develop future researchers are already based on *doing research*, under supervision, in an apprenticeship model which gradually initiates the research student into full membership of a disciplinary research community. The PhD dissertation project is, perhaps, the ultimate inquiry-based education program, but it is not the only one. Universities and colleges are gradually acknowledging that even undergraduate students should develop these capabilities and dispositions to some extent, because they will live in a world in which inquiry matters because answers provided by others are not always to be trusted. Perhaps this was always the case, to some extent, but the recent advent of the internet and the so-called democratization of information have made this even more so. Programs that aim to develop competent inquirers should be based on *conducting inquiry*, possibly in groups or teams, under supervision, in an apprenticeship model. The questions being investigated by undergraduate inquirers will not have to be the cutting-edge

disciplinary research questions asked by PhD students – they will simply need to be amenable to debate, hypothesizing, analysis and evaluation, in the light of evidence. When trying to develop students' capabilities and dispositions for engaging in inquiry, constructivist teaching methods are not only the best way – they are probably the only way.

It takes more than the ability to recite theoretical knowledge to be a professionally-skilled business manager, lawyer, architect or doctor, and it takes more than the mastery of established knowledge to be an effective inquirer or researcher or creator of new knowledge.

If there was ever a time when business education was concerned with theory, alone, that time has passed. Powerful stakeholders such as business firms that employ graduates, governments and business school accreditation agencies are pressing business educators to broaden the learning outcomes addressed by their programs. As this process continues, constructivist teaching methods are likely to become more and more important within business education.

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