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Advancing the skill set of SCM graduates – An active learning approach

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Advancing the skill set of SCM graduates – an active learning approach

Skill set of
SCM graduates

1683

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Abstract

Purpose – Drawing on a novel approach to active learning in supply chain management, the purpose of this paper is to describe and analyze how the students' learning process as well as their learning outcomes are influenced by the learning and teaching contexts.

Design/methodology/approach – A case study of a master's level purchasing course carried out at two universities in which students work in projects resulting in jointly authored books.

Findings – The findings show how the teaching context influenced the learning process and the learning outcomes. Active involvement, self-directed learning, collaborative learning and learning from practice enabled by the set-up of the course are identified as key mechanisms for the learning outcomes in relation to skills and content.

Originality/value – Increasingly, supply chain management graduates have to develop professional, practical, research as well as metacognitive and life-long learning skills during their university education. This paper identifies mechanisms and illustrates how educators can use the set-up of a course to enable students to engage in a learning process resulting in a variety of skills as well as specific content-based aspects of knowledge.

Keywords Skills, Purchasing, Active learning, SCM, Teaching methods

Paper type Case study

Introduction

As the field of supply chain management (SCM) is evolving, employees in the field have to obtain a richer skill set to cope with new job demands (Wu, 2006); a challenge as much as an opportunity that educators have to deal with. Similar to other disciplines SCM graduates require professional skills such as social, decision-making, problem-solving and time management expertise just as much as general and practical knowledge on specific SCM-related topics (Lutz and Birou, 2013). Hence, educators cannot only focus their attention on goals with regard to faculty aims (e.g. research driven education) and the acquisition of high-quality knowledge, but need to utilize approaches that also help to develop problem-solving, metacognitive and life-long learning skills (Grabinger and Dunlap, 1995; Könings and Brand-Gruwel, 2005) in line with the "Dublin Descriptors." Therefore, new teaching ideas and course designs are required that can facilitate and enhance the extended skill sets required.

Active student involvement in concrete experiences has been shown to lead to improved learning (Fish, 2007) such as higher student engagement with the subject, the ability to understand complex non-mechanistic relationships and the development of higher order

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skills (Piercy *et al.*, 2012). For that, an integrative approach to SCM education is needed, linking industry relevant skill development with research skill development to prepare students for the real world (Van Hoek, 2001). Yet, Lutz and Birou (2013) found no reference in syllabi to management skills (including project management skills which is a clear necessity from an industry point of view). Traditional lectures, a familiar way of setting up a class with known outcomes, hardly allow for the development of such skills. On the other hand, new course designs that incorporate new learning strategies require additional time for the design and are uncertain in terms of the learning process and outcomes. This seems to be a challenge for many educators. We therefore aim to describe and analyze how the student learning process as well as their learning outcomes are influenced by the learning and teaching contexts in a new teaching set-up. We draw on the experiences from two purchasing courses held at Chalmers University of Technology (2008-2012, 78 students) and at the University of Groningen (2013-2015, 117 students), which were designed based on active learning approaches to facilitate deep knowledge and ultimately the development of research, practical, professional as well as metacognitive and life-long learning skills.

Our paper makes three key contributions. First, as highlighted by Van Hoek *et al.* (2011) there is a limited amount of papers available that are of relevance to the role of educators in SCM, even less in the domain of constructivist learning strategies that can facilitate the achievement of higher order skills. Our findings extend the current body of knowledge by reflecting on underlying factors that influence the development of skills that may result from novel course set-ups. Second, moving away from traditional lectures to active learning approaches also requires a shift from the “teacher as expert” role to “teacher as facilitator of learning” (Mckimm and Jollie, 2003; Zsidisin *et al.*, 2013). Therefore, our findings may guide educators in what to consider when implementing active learning approaches. Finally, the description of the book project courses may hopefully inspire other educators in SCM to develop and extend the options of the often narrow range of current course set-ups.

The paper is outlined as follows. We begin with a review of existing literature on conceptions of learning, teaching, learning and teaching approaches and their link to learning outcomes. Next, we present the case study design. Following, we describe our findings and reflect on the teaching context in light of the student learning process and outcomes. The conclusion draws implications for teaching practices and suggest directions for future research on learning and teaching in SCM.

Theoretical background

To be able to develop the required content knowledge and skills in SCM graduates, it is important to first understand how learning takes place and what factors influence the learning process. Students learn for a variety of reasons, which together with the contextual factors in that they are placed (presage) determine how they go about their learning (process), ultimately determining the quality of the outcome (product) (Biggs, 1991). In line with that, research into student learning has shown a relationship between student conceptions of learning, learning approaches and learning outcomes as well as lecturers’ conception of teaching, teaching approaches and possibly student learning approaches and outcome (Kember, 1997). These relationships are depicted in Figure 1.

The learning environment is central to learning (Carnell, 2007) constituted by presage factors that exist before the student enters the learning situation (Biggs, 1987): student characteristics, learning style and the teaching context. Student characteristics and learning style relate to the individual’s independent conceptions of learning and teaching based on prior knowledge of the academic task, a particular IQ as well as cultural values, personal traits, expectations concerning achievements and orientations toward certain approaches of learning (Biggs, 1987, 1991). The teaching context, on the other hand, is the environment purposefully set by the teacher and the institution (Grabinger and Dunlap, 1995) through

Figure 1.
The relationship
between conceptions
of teaching and
learning

Source: Adapted from Biggs (1989), Kember (1997)

the curriculum design, conceptions of teaching, course structure, methods of teaching and assessment (teaching approach). Similarly to the student characteristics, individual educators have little control over institutional factors such as mission and regulations. Nevertheless, both student characteristics and institutional factors need to be considered in a teaching approach to create a “controlled classroom climate” (Stefani, 2009).

All teachers have some theory of what teaching is, even if they are not explicitly aware of it (Biggs and Tang, 2011). Different conceptions have different implications for teaching approaches via course design, the tasks of the teacher, methods of teaching, the construction of learning opportunities and methods of assessment (Brown, 2004). Taxonomies of learning allow educators to focus on different schemas for understanding learning while questioning their assumptions of and expectations for learning and teaching (Young, 2008). One such taxonomy containing knowledge as well as skills elements was established by Bloom *et al.* (1956). The taxonomy articulates six levels of thinking (remember, understand, apply, analyze, evaluate, create) going from low-order skills toward higher-order skills. Similarly, the Structure of the Observed Learning Outcome (SOLO) Taxonomy by Biggs and Collis (1982) provides a systematic way of describing how a learner’s performance grows when mastering many academic tasks (Biggs, 1991). It reflects quantitative changes in relation to the amount and detail of knowledge (uni-structural becoming increasingly multi-structural), followed by deepened understanding and qualitative restructuring of the same (relational, then extended abstract) (Fry *et al.*, 2009).

To achieve qualitative, higher-order goals, teaching needs to be seen as changing the ways students perceive and use knowledge (Carnell, 2007). McKimm and Jollie (2003) suggest a shift from the “teacher as expert” role, in which mostly didactic teaching methods are used, to “teacher as facilitator of learning”, in which teachers give guidance to learners in relation to resources and sources of knowledge just as much as being the sources of knowledge themselves. Students need to be supported in constructing their own knowledge (Parpala and Lindblom-Ylänne, 2007), so that learning is not perceived as a passive process of simply taking in information from teachers and lecturers, but an active process that involves more personal thinking and questioning (George, 2002). In doing so, students take more responsibility for their own learning than the traditional lecture-based approach (Prince and Felder, 2006). Teaching approaches that allow for active learning give students a considerable amount of autonomy, choice and control of the direction of the learning activities (Anthony, 1996). While lectures explain as well as package and tutorials clarify and extend, these contexts do not necessarily lead to high-order learning (Piercy *et al.*, 2012); lecturing itself does little to challenge or question the students’ interpretations (Biggs, 1996). Consequently, teachers need to stimulate competences by activating and appropriately widening the range of learning-related activities (Biggs, 1996). Different techniques ranging

from collaborative learning to writing tasks, peer feedback and class discussions are associated with active learning as long as students are involved and reflect on what they are doing (Bonwell and Eison, 1991; Keyser, 2000). Through active engagement in the learning process, students are more likely to internalize, understand and remember material learned (Bonwell and Sutherland, 1996).

However, the students themselves determine how they engage in the learning processes. The personal learning style of a student, which can be linked to self-conception with respect to learning, motivations for learning, control strategies and conceptions about cognitive strategies influence whether learning takes place at a surface or deep learning level (Vermunt, 1996). Surface learning is typified by an intention to complete the task, memorizing information as well as making no distinction between new ideas and existing knowledge (Fry *et al.*, 2009), i.e. if the university is seen as a means to an end (Biggs, 1991). It is related to lower-order learning as per Bloom and SOLO taxonomies. Deep learning on the other hand arises from a felt need to engage in the task appropriately and meaningfully (Biggs and Tang, 2011), which allows students to “attempt to relate concepts to existing understanding and to each other, to distinguish between new ideas and existing knowledge and to critically evaluate and determine key themes and concepts” (Fry *et al.*, 2009, p. 10). A deep approach to learning involves taking responsibility for one’s own learning (Prince and Felder, 2006). Therefore, deep learning is associated with long lasting and higher-order learning. While students’ approaches to learning and their intention determine the extent to which they engage with the subject (Fry *et al.*, 2009), an approach to learning should not only be seen as a pure individual characteristic, but also as a response to the teaching environment in which the students are expected to learn (Stefani, 2009). The learning system needs to be manipulated in a way that it requires students to adopt a deep learning approach in order to meet the course’s learning outcomes (Meyers and Nulty, 2009).

The immediacy of operations-related decision making and the dominance of empirically derived concepts make SCM-related courses seemingly well-suited to more applied and active methods of teaching (Brandon-Jones *et al.*, 2012) that lead to higher-order learning and deep knowledge. This is important in a fiercely competitive and evolving environment, as SCM employees have to obtain a richer skill set to cope with new job demands (Wu, 2006). Learning to think critically, analyze and synthesize information to solve problems, to work productively in groups as well as social decision making and time management skills are as important as general and practical knowledge on specific SCM-related topics (Lutz and Birou, 2013; Grabinger and Dunlap, 1995). Therefore, it is important that aspiring SCM professionals receive the appropriate opportunities and guidance to develop the required job skills (Dischinger *et al.*, 2006). However, Fawcett and Rutner (2014) found a growing gap between academics and practitioners and hence education providers and educational needs, specifically in relation to market relevance and research-driven skills (van Hoek, 2001). It has been shown that communication, technical, strategic planning, team building, decision making and broad financial skills are required from the supply manager of the future (Giunipero *et al.*, 2006). Yet, universities continue to focus on subject-specific knowledge such as inventory management, warehousing, logistics, strategy, network design, etc., paying little attention to general management skills that are required from industry (Lutz and Birou, 2013). Our paper closes this gap as in the teaching approach under scrutiny not only job specific knowledge, but also skill development was considered. In line with the aim of this paper, we therefore explore how the student learning process as well as its learning outcomes were influenced by the learning and teaching contexts of a novel SCM course set-up.

Method

We draw on data from two courses with the subject of purchasing at the master’s level at Chalmers University of Technology, Sweden and the University of Groningen, the

Netherlands – see also Table I. Hence, we incorporate two cases of a book project based course and 11 course events (resulting in one book each). Employing a case study approach allowed for the necessary in-depth insights and understanding required to unravel mechanisms (Yin, 2009) that link the teaching context to learning process and learning outcomes in line with the focus of this paper.

The aim of the courses was described as to: “[...] capture the state of the art in the area of purchasing and supply management both theoretically and in relation to current practices.” The courses lie within the domain of project-based learning, one approach within the constructivist theory, where students are given an assignment to carry out one or more tasks that lead to the production of a final product (Prince and Felder, 2006). During the course students got hands on experience of project management, resulting in a jointly developed academic e-book on the “State of the Art in Purchasing” with a specific focus that is decided upon by the educators.

While the structure and content of the book(s) reflect current practices, research and theoretical ideas such as purchasing in relation to the SCM field, strategic alignment, supplier management, and sustainability, the specific contents were decided jointly by the teachers and the students. Students in groups of 3-5 applied the main theories and concepts of purchasing by means of writing a book chapter. In Groningen, the content of the chapter was presented to the other chapter groups during chapter presentations, followed by room for discussion to reflect, further illustrate, explain and align the individual chapter with the rest of the book. At Chalmers, several different approaches were tested with different degrees of freedom and responsibilities for the students, e.g. to moderate workshops, and with regard to finding the key literature on their own. Furthermore, all chapters contained practitioner insights, which were provided by guest lectures and interviews with key informants throughout the course. Furthermore, an “editorial team” was formed in the beginning of the course to coordinate the project throughout the period. Apart from coordinating the work the editorial team also wrote the introduction chapter/editorial and edited the final book. At the end of the course, the book(s) were presented to a group of purchasing practitioners.

	Chalmers University of Technology	University of Groningen
Workload	7.5 ECTS ^a = 200 hours	5 ECTS ^a = 140 hours
Projects	2008-2012 (one book per year)	2013-2015 (two books per year)
Number of students	78	117
Course	Elective course within the Supply Chain Management master's program	Core course within the Supply Chain Management master's program
Themes of the books	Purchasing Management (2008) Global Purchasing (2009) Transport Consequences of Strategic Purchasing Decisions (2010) Supply Base Structuring (2011) Measuring Buyer-Supplier Relationship Performance (2012)	Sustainability and Globalization (2013) Sustainability and Technology (2014) Services and Globalization (2015)
Grading based on	Overall book (Group) Book chapter (Group) Reflection (Individual)	Book Chapter (Group) Chapter Presentation (Group) Chapter Integration [and Reflection] (Individual)

Notes: ^aEuropean Credit Transfer and Accumulation System (ECTS) is a tool that helps to design, describe, deliver programs and award higher education qualifications. ECTS credits are based on the workload students need in order to achieve expected learning outcomes (European Commission)

Table I.
Overview course characteristics

Guidance concerning literature search, interpretation, analysis and writing as well as project management and teamwork was offered throughout the course and appointments with the teacher(s) could be made at any time. During the last time the course was given at Chalmers, there were appointments with the class scheduled regularly in addition to the individual, voluntary supervision. Providing students with formative feedback was found to be an essential element of the course design at both universities. Students received oral and written feedback on the chapter outlines, the chapter drafts, chapter presentations and the final book presentation. This allowed students to improve their performance on the same task. Furthermore, at Chalmers, at the end of the course the students also received book reviews from two external scholars in the SCM area. These three page reviews included both an overall assessment of the whole book as well as comments on each chapter. An example overview of the course set-up in Groningen is given in Table II.

The teaching context was developed and evolved over the years at both universities. At Chalmers, the teaching approach to the subject area was “tested” by setting different frames or themes for the book. The whole range from general themes, e.g. “Purchasing management – state of the art” (in 2008) to highly specific ones, such as “Transport consequences of strategic purchasing decisions” (in 2010), was tried out. The more specific themes seemed to facilitate the work within the class since more limits and boundaries were experienced for exploration of the topics. Specific themes also contributed to the better coherence of the final books. In Groningen, the design of the course needed to allow for students with no knowledge to gain in-depth insights on the topic, while experienced students needed to have a chance to gain more knowledge on specific details. Therefore, topics of the book were kept rather broad.

The learning objectives were developed (see Table III) focusing on the subject area and skill development such as project organizing, communication and teamwork related to (almost) all of the levels of thinking suggested by Bloom (1956) and the SOLO taxonomy suggested by Biggs and Collis (1982). Hence, in line with the curriculum objectives of the

	Teaching method	Deliverables student	Feedback
Week 1	Introduction to the course (2 h)		
	Introduction to purchasing (2 h)		
Week 2	Guestlecture (2 h)	Book Proposal	
	Development of book outline (2 h)	What is strategic purchasing	
		Book outline	
Week 3	Guestlecture (2 h)	Chapter Outline	Feedback
	Project management (1 h)		Chapter
	Editorial Team announcements (1 h)		Outline
Week 4	Guestlecture (2 h)	Presentation on chapter content	Feedback on
	Chapter 2 presentation (1 h)	Critical questions based on two articles in	presentation
	Chapter 3 presentation (1 h)	preparation for Chapter Presentation	
Week 5	Guestlecture (2 h)	Presentation on chapter content	Feedback on
	Chapter 4 presentation (1 h)	Critical questions based on two articles in	Presentation
	Chapter 5 presentation (1 h)	preparation for chapter presentation	Feedback
		chapter drafts	chapter drafts
Week 6	Guestlecture (2 h)	Presentation on chapter content	Feedback on
	Chapter 6 presentation (1 h)	Critical questions based on two articles in	presentation
	Chapter 7 presentation (1 h)	preparation for chapter presentation	
Week 7	Summary Lecture (2 h)	Final book chapters	Feedback on
	Chapter 8 presentation (1 h)		presentation
	Conclusion and feedback (1 h)		
Week 10	Book presentation to industry	Final book (editorial team)	
		Individual chapter integration	

Table II.
Course outline
Groningen

Table III.
Summary of
learning objectives

Bloom	SOLO	Learning objectives Chalmers	Learning objectives Groningen
Remember	Uni-structural	Search for and identify current practice oriented management principles in the area of purchasing management	
Understand	Multi-structural		Discuss the essentials and principles of modern purchasing and supply management at an advanced level Integrate the discussion of theory with research findings
Analyze	Relational	Scrutinize intra- and inter-organizational phenomena empirically by making interviews and by other means interacting with practitioners to collect data Analyze current practices in terms of generic concepts and theoretical frameworks Organize the work into a project and sub-projects including planning and chairing seminars and other meetings to coordinate the project	Identify, explain and analyze current practices in terms of generic purchasing concepts and theoretical frameworks
Evaluate	Relational		Evaluate and compare relevant scientific papers in the area of purchasing
Create		Actively participate in seminars and meetings prepared and chaired by other students Assume and follow project leadership Communicate the own contribution and align it with the others to achieve a coherent whole Cooperate within the class in order to jointly achieve an e-book describing the state of the art in the area of purchasing management	Develop, apply and present purchasing knowledge in a project
Create	Extended Abstract	Distinguish and reflect on the own contribution to the joint effort	Distinguish and reflect critically on their own contribution to the joint project

overall SCM master's programs, the courses capture a mix of managerial and theoretical aspects of purchasing linked to research and industry relevant skills (e.g. project management) at a higher-order level in the learning objectives to achieve deep knowledge.

Data collection and analysis

We draw on data from the individual reflections of students written at the end of the course as the main source of data, supplemented by course evaluations, feedback sessions and our own experiences. The main part of the reflections focused on the student's individual performance and contribution during the project in relation to the specific learning outcomes and their learning experience. Hence, students were asked and encouraged to reflect on their own learning and not to evaluate whether they liked the course or not. We received 188 self-assessments that we used for coding and analysis which were generally reflective and often self-critical.

In analyzing the data we first reduced data into first-order codes under the headings of presage, process and product. Following, these paragraphs, sentences and sentence fragments were coded into detailed second-order categories based on their specific content such as discussion, motivation, skills, previous knowledge, learning from each other, etc. After several rounds of review, third-order themes emerged that grouped these detailed codes into areas that showed mechanisms in which presage influenced process and/or

product, or process influenced product. We used NVivo 10 for the data analysis process as it allowed us to reduce, re-assemble and analyze the data in a systematic way. Furthermore, the program allowed us to count references in relation-specific inductively coded skills that were mentioned by the students. In the qualitative research, counting is a good way of seeing how robust insights are (Miles and Huberman, 1994), which was of particular interest to us as we were seeking to find out how the learning process influenced the learning outcomes, i.e. skills. In line with the objective of this study, the overall analysis aims at analytical generalizability and, hence, to achieve a greater understanding of the processes and outcomes of active learning based on the two specific course cases.

At the end of the process of writing the paper, we asked 15 former students to validate our findings. In total, we received responses from 12 alumni. All but one strongly agreed with our findings. The one who did not state that she fully agrees argued that although the opportunities for the learning outcomes that we describe were generally present, the workload was too high for deep learning to be fully captured. She tried to do very well and strived for the best as an editor which did not allow her to completely engage in all the different learning methods. As a result, she perceived that she learnt a lot concerning project management but less with regard to purchasing (as compared to a traditional course set-up). In all 12 responses the former students highlighted, in retrospect, the importance of the “soft skills” (e.g. teamwork, communication, pro-active behavior, feedback to peers and time/project management) that they learnt and developed during the course.

Discussion of findings

In this section, we report and reflect on the findings of the courses. In particular, we explore how the learning context influenced the learning process and learning outcomes. Following, we discuss the different mechanisms separately to be able to give in-depth insight, even though some of the findings link to each other.

Learning Process

Student involvement. Effective teaching involves co-constructing knowledge among educators and students, in a process where the boundaries between their roles become blurred (Carnell, 2007). Our experience is congruent with this as we found the boundary between the teaching and the learning domains to be not self-evident. They needed to be “negotiated” (during the course process) and tried out (over the years) to find the right balance between the amount of guidance provided by the educators in relation to the initiatives taken by the students. There is a trade-off between instructors being fairly directive to maintain a focus on course and curriculum objectives, and allowing students the autonomy to choose their own project formulations to increase their motivation (Prince and Felder, 2006). Some students would have liked “more input from teachers, who acted like coaches instead of really teaching something” (2015). Yet, this quote highlights the essence of the course set-up where students had to get actively involved as the role of the educator moved from “teacher as expert” toward being a facilitator of learning in line with the constructivist learning theories. Others found that “it was very fun to nearly manage a course and take responsibility of the outcome” (2008). Based on experience and “testing” over the years, the students were given more responsibilities but also more guidance, e.g. by additional paper references or introductory lectures for those students with no background knowledge at all.

Students appreciated the chance to be involved and to contribute to the course content: “I liked the fact that everybody had to come up with a book outline and that we discussed together how the book was going to look like. That way, everybody could contribute and really became our book” (2013). “From the first tutorial it felt like the whole group was

involved in deciding on an outline and committed to writing a notable book" (2014). The fact that students were involved in decision making, the content of the course and book (e.g. "This is an area of my interest and the fact that we got to choose subject ourselves was very positive" (2009)), frequently received feedback and the "open door" policy created a different learning environment that many students found attractive: "the little less formal interaction, flexibility, willingness to help and the way you provide us with feedback, was very appealing to me" (2013). "I liked the set-up of these lectures too, the informal way and the personal attention and feedback we received" (2015).

Furthermore, we found that particularly the scope of the project, i.e. one aim for the overall class gave additional motivation to students in two ways. First of all, it encouraged students to enroll in the class (e.g. "Writing the book motivated me to follow this course" (2013)) and second to engage in the learning process: "involving me in the project of writing a book, made me realize that I really had to make an effort, because if I performed poorly, the whole group would be affected by that. I can really say that this philosophy had a positive impact on me, and made me really committed to the project" (2013). This shows that via involvement students engage in the learning process and develop a feeling of ownership for the overall project individually, but also in relation to each other: "I am particularly proud of how the whole process of writing a book worked out. [...] For me personally this was one of my main goals, to provide circumstances that would give everyone the chance to complete the course with a good experience and the feeling that this course was worth taking and worth contributing to" (2008). "I really liked the form of teaching, as an editor I felt myself concerned" (2014).

Self-guided learning. Students in higher education must engage with and take considerable responsibility for their learning (Fry *et al.*, 2009). This implies that they need to be aware of what their knowledge gaps are and what information should be gathered for a successful completion of the project (Dahlgren *et al.*, 1998). Students are not able to actively construct and evolve their knowledge structures without taking responsibility and initiative for their own learning process (Grabinger and Dunlap, 1995). "I learnt that these tasks and deadlines were not defined by anyone but by my own team and me" (2015). "The time line was created by me based on my own ideas for appointments for seminars and deadlines, decisions within the editorial board about deadlines as well as through the course syllabus given events and deadlines" (2009). Yet, often traditional lectures prevail with little responsibility on students for their own learning process: "In my previous study, I was used to learn books and reproduce the mandatory learning material. Consequently, I had to get used to the type of education in this course" (2015). The set-up of the courses at both universities gave students considerable amount of own initiative, decision making and responsibility for their own learning process: "Interestingly, this specific course was not about being 'spoon-fed' purchasing theory, but rather about exploring purchasing themes of our own accord with guidance from professionals and through class discussions" (2015). "I also learnt to take more initiative in studying, not just relying on lectures. When I prepared everything before the class and took my questions in the discussion, I was more involved" (2014); "We have never worked like this before, with no lectures and with other pressures to deliver. Not only did I have to rely on myself but also trust my peers in coming through for the group as a whole. I think the end result ended up being better than any of us expected, maybe to the surprise of a few, at least it was for me [...]" (2010). While the students were given responsibility for their own learning, guidance via the different course elements such as the presentations and seminars as well as feedback on written drafts was provided to students throughout the course. "We learned by ourselves, but teachers were always beside us to guide us, and the editorial team was always there for supporting us" (2013). "To reach the objective of a very good chapter, I looked also for additional help and support from the Professor, who led me through the process of writing

the chapter" (2009). However, as presage students' factors in relation to learning style differ ("it depends on myself how big the learning curve was" (2013)), not everyone learns in the same way or is equally enthusiastic about all types of content (Fry *et al.*, 2009). The findings of the courses at both universities support this as some students were better able to deal with the self-directed learning than others, some students enjoyed the course while others did not and some were more motivated to engage in deep learning than others. On the one hand, students can focus on their personal development as a goal of learning and studying (deep learning) (Könings and Brand-Gruwel, 2005): "since I found the topic and the way of working very stimulating I put a lot of effort into this course and I have been extremely determined to aim for the highest grade possible" (2010). On the other hand, more externally regulated students largely depend on the environment to determine what must be learned and how it must be done (Könings and Brand-Gruwel, 2005): "The 'finding your own way' attitude of the course has been frustrating at time but the reward was therefore bigger and it simulated real life better" (2013). This often leads to studying as a means to an end (surface learning), e.g. to receive a master degree. We found, however, that the set-up of the course and self-guided learning enabled some students to further develop their personal learning style (Fry *et al.*, 2009): "In the beginning I was taking the course to get five points and no exam was really exciting to me. However, writing a chapter and really digging deeper into subject of purchasing, which is not part of my master, was therefore challenging for me. And at the end, I am glad I took the course" (2014). Additionally, we found that the learning style influenced the view on the course and effort required to complete it successfully. Some students thought that it took too much time to read and identify the right literature, continuously revise a document after receiving feedback and integrate a chapter with the rest of the book. Issues such as time spent and commitment have been previously highlighted in the literature as drawbacks of active learning (see, e.g. Bonwell and Eison, 1991).

Collaborative learning. Collaborative learning is the instructional use of small groups in which peer interaction plays a key role in the learning process (Yazici, 2004). While self-guided learning is important, students also need to have an active and constructive role in the learning process through interaction and negotiation (Grabinger and Dunlap, 1995; Könings and Brand-Gruwel, 2005) as learning takes place in a social context among peers and teachers (Grabinger and Dunlap, 1995; Niemi, 2002). We found that students particularly liked "the fact that you learned via communication with other group members and students" (2015). "By listening to the other presentations I could also learn other important conclusions in regards to the purchasing area" (2008) as "there where opportunities to discuss with the other students and find together a more total picture of purchasing" (2013). The tutorials during the course tried to make the learning and problem solving process public, where students were given the possibility to interpret the group processes and how to convey and receive useful feedback (Dahlgren *et al.*, 1998). "I learned the most from the discussions, since talking about each other's opinion results in better understanding of the theory. During these discussions, the theory could be integrated into the other chapters, in this way the overall picture became much more clear" (2014). "I was actively involved with the groups' presentation and tried my best to give them some useful feedback" (2010).

In Groningen, the course purchasing brought together students from numerous backgrounds (MScs, knowledge backgrounds and nationalities). These presage factors in relation to personal characteristics and context factors have to be considered not only in the design of the course, but also in all teaching and supervision activities as they will affect the learning outcomes. After reflecting on feedback from students in 2013, the educators in Groningen decided to purposefully form chapter groups on the basis of student's background and previous knowledge on the topic. Therefore, all students were asked to fill out a short

questionnaire in relation to their bachelor degree, current master degree, start of the master degree (February or September) and previous experience on the topic of purchasing (work or courses). Based upon the questionnaire, heterogeneous students were allocated to groups aiming to have the groups as similar as possible based on the student's characteristics. This was not only to enable teaching each other from diverse points of view as students learn not solely from experts and teachers (Grabinger and Dunlap, 1995), but also to allow for complementarity in the differences in background knowledge. We found that students appreciated the diversity in teams, but also in the overall course: "It is really a multi-cultural team, from marketing, technology management and supply chain management background. This international background does not hinder the progress but triggers more discussions during the group assignment" (2014); "I was working in a group with one marketing student and one operations student. It was interesting to see how we all thought about specific topics from the perspective of our own discipline (marketing in my case). These diverse views have, in my opinion, really contributed to the development and content of the book chapter" (2015). Furthermore, collaboration helps to motivate student preparation because group members may want to avoid disappointing each other (Yazici, 2004). "We all showed interest and involvement while writing the chapter, we were committed to discuss and give suggestions regarding to every subtopic, and in case of doubts, we were always there to provide an opinion and evaluate the best possible option" (2014).

As in any group work, we had teams that did not work together in the best way. Students were encouraged to highlight any problems of "free riding" early on. Furthermore, in Groningen, a peer-review system was used, where students could indicate their individual contribution. This was followed by a meeting between the group and the two educators to evaluate whether the overall grade achievement for chapter had to be distributed differently amongst the team members. As there were only a small amount of groups with problems, we will not go into further details on the process here as it is outside the scope of the paper that concentrates on how the learning process and outcomes were influenced by the teaching context.

Learning from practice. As real-life problems have a different context than the learning environment, students need to be able to transfer knowledge and skills they learned at school to new situations (Grabinger and Dunlap, 1995; Könings and Brand-Gruwel, 2005). "I have been able to implement my background knowledge about sustainability to a relatively new topic for me: Purchasing" (2013). "I could bring in a lot of my previous knowledge from practice [work experience] and we combined that with more theoretical insights we all derived" (2014). We found, congruent with Van Hoek *et al.* (2011), that insights from the industry via guest lectures or interviews with key informants are essential for students to understand how theory works in practice while moving from a lower level to higher-order learning. "Being able to learn by seeing the direct application in the real word through the various guest lectures was beyond doubt one of the most efficient ways to understand about the different strategies for purchasing different types of products, understanding the tactical, operational and strategic level of the purchasing function and how it can be organized (centralized or decentralized), and realizing the importance of relationships and contract management" (2015). "This is one of the few courses where the theory gets so much involved with the practice. This helps understanding the articles much better and getting an idea of what purchasing is about in real life" (2015). Furthermore, it allowed students to question and discuss theory in practice, which, at times, can be quite different: "The facts that came out of that meeting [interview with a practitioner] also supported many of the hypotheses I had, but in a couple of cases also didn't quite align with what I expected and what some articles suggested, so in all it was a very useful meeting" (2012).

The possibility of having interviews with practitioners to derive small case studies and connect theory with practice was very much liked by students in Chalmers. Therefore, in line

with this and in reflecting on the past three years of the course in Groningen as well as the positive feedback on the involvement of practitioners in the course, the educators have decided to further engage with practice. From 2016 onwards, every book chapter will have a mentor from the industry to enable further discussion and integration of theory with practice.

Product: learning outcomes

Students who are involved in project-based learning are more motivated, demonstrate better communication and teamwork skills and have a better understanding of issues of professional practice and how to apply their learning to realistic problems (Prince and Felder, 2006). We found that students developed content-related knowledge evident in the grades of the presentations, book chapters and individual assignment via the different learning processes we identified: active involvement, self-directed learning, collaborative learning and learning from practice. "The course gave me a lot of understanding about purchasing organizations and how significant part the purchasing is playing in supply chain management" (2010). Yet, one of the criticisms of project-based learning is that students concentrate on one specific aspect of a subject, which takes time and therefore are not able to cover all of the curriculum. "Although I think that I obtained a lot of knowledge about purchasing in this field, I also feel that this knowledge is rather focused on the aspects of purchasing treated in our chapter and this assignment [individual assignment of connecting 3 chapters]" (2014). Yet, another student reflects "I thought that, in the end, I would only have knowledge about my own chapter, but because of the presentations and the articles we had to read, I also gained knowledge about the other chapters" (2013). This again highlights the differences in student characteristics and learning style which affects the learning outcomes. However, we found that often students involved in active learning do not realize straight away what they have actually learned and achieved as much of the learning is not explicit (e.g. studying from a book or slides), but evolves via discussion and being involved in the different activities. "Now, with some distance to all the topics, being asked to write the individual assignment and in that also taking deeper looks into the theory of the other topics it seems that there is a much more diverse overview of all the topics than I thought directly at the end of the lecture weeks" (2014).

Furthermore, we found that students developed a variety of skills during the course. Team work skills are among the most important and most difficult ones to learn in formal educations and put high demands on the teaching context. Collaborative learning, as employed in the two courses, is twofold: to enhance students' learning and to develop students' social skills like decision making, conflict management and communication (Bonwell and Eison, 1991). "I really pride myself on my leading and organizing the team to write a good chapter" (2009). At the same time, in "traditional" group work students work in smaller teams which do not require, or permit training in larger scale coordination and organizing skills. Hence, the book project courses takes team work and organizing skills to a more advanced level. "Actually, I can say there were two courses in one – purchasing and project management" (2013); "I think it was a good possibility to learn more about industrial purchasing theories and also enhance my project working skills" (2010). These experiences were also the most frequently commented upon (in a positive way) in the students' self-assessments. Accomplished skills mentioned in the individual reflections include academic writing, time management, project management, team work, organizing, management, presentation and teaching. A quantitative overview of skills mentioned in the reflections in Groningen, where students were specifically asked to reflect on skills, is given in Table IV. However, the quality of learning depends not only on learners' abilities to steer their own learning orientation by developing inquiring skills but also to learn to reflect on their own learning processes (Niemi, 2002). In their reflections, students not only demonstrated the ability to reflect on the learning process in relation to learning objectives, but also skills that were not fully developed and could be improved in future tasks: "I could

Table IV.
Skill development
in Groningen

Skills	Key associations	Number of students referring to the skill with $n = 42$	Illustrative quote
Academic	(academic) writing, objectivity, gathering information, referencing, reading, analytical and critical thinking	21	I realized that my ability to write and express my ideas and thoughts has grown stronger at every part of the chapter I had to deliver (2014) In this course I have improved my skills regarding planning, communication and independent working. Under the latter I also understand the searching of scientific information (2015)
Communication	Discussion, Presentation	9	Working within the editorial team was a high responsibility and multifaceted in the range of duty. It increased my organizational and management skills as well as writing, presentation, teaching, and team-working skills (2014). My main learning points for this course were to start earlier and to meet in person to discuss things more often (2015)
Project Management	Monitoring, Management, Coordination, Organizational, Guidance	12	I learnt which management styles were necessary in different project stages or situations, e.g. when it was necessary to push and when to pull people or when decision without involvement were necessary and when participation was fruitful. I also learnt that the editorial team had the power to question standards to make improvements (e.g. switch from Nestor to Google drive) (2015) This provided a learning experience as it took some leadership and clear guidance on my part to ensure that the chapter was written from a supply chain perspective (2014)
Team work	Interpersonal	18	In that sense, I learned to take the lead when necessary, but also help my other team members rather than criticize them in order to deliver the best possible outcomes (2014) Now, our team-working skills were demanded (2014)
Time management	Planning Deadlines	8	The course purchasing learned me that making a good planning and sticking to it is very important in a group project (2015) It has further given me insight in how to work in a team with very strict deadlines, even though my team was great (2015)

have introduced shorter feedback loops and more communication in order to improve the quality of our chapter and the coherence between the several topics discussed" (2013).

Overall, there has been some evidence that student-centered teaching approaches encourage deep approaches to studying and learning (Prosser and Trigwell, 1999 cited in Fry *et al.*, 2009). This is also confirmed by the book project students:

- "One of the benefits of this teaching style is that you will not soon forget all the gained knowledge. When you have an exam you start studying really hard two weeks before the exam, but after that you will forget a lot as well" (2015).

- “To sum up, I’m very glad I took this course as it not only gave me possibility to apply and to improve my project management skills, but also provided many different perspectives on cooperation and working on a much bigger project than was possible during the education so far, and last but not least, it structured up all learnings of the last two years, including all courses related to SCM, but also other courses. This course showed me that most of the theory I have learned can be applied in a project, in one or another way” (2010).
- “This course was the first in my study-career that focussed on the total learning process by doing more than emphasizing learning from books and papers” (2015).
- “As a whole I think that this course has been one of the best learning experiences I have had during my time in Chalmers” (2012).

Conclusions

SCM managers must have the ability to integrate skills from across multiple disciplines in “the most desirable business mix” (Gravier and Farris, 2008). Our findings show that the book project course provides unique opportunities to capture and integrate various skills, competences and perspectives based on an active learning approach. Active learning emphasizes not only content-related knowledge, but also development of the students’ skills and engagement in activities, and the students’ exploration of their own attitudes and values (Bonwell and Eison, 1991). In particular, we analyzed how the set-up of the teaching context based on active learning methods influenced the learning process and the learning outcomes. Our results show that students who are actively involved in the learning process by taking responsibility, engaging in collaborative learning and by taking the chance to learn from practice are able to develop higher-order learning in relation to content as well as skills that are needed in today’s job environment. Furthermore, it appears that this allows students with different presage factors (personal characteristics and learning style) to engage with a subject and achieve higher-order learning. The active learning methods employed allowed for learning to occur in a concurrent variety of ways enabling heterogeneous students to learn together and in different ways.

To enable higher-order learning that goes beyond memorizing, storing and retrieval of information, teaching, or the facilitation of the learning process, a timely, relevant and engaging way is required (Van Hoek *et al.*, 2011). Yet, traditional lectures as a familiar way of setting up a class with known outcomes often prevail as a teaching method. Dealing with uncertainty in relation to the learning process and learning outcome can be a challenge for educators. When reflecting on the course(s) from a facilitator’s perspective, we can conclude that a different attitude toward teaching is required. Due to students’ active involvement in decisions regarding content and process, a lot of flexibility and creativity is required. There is a need to think together with the students rather than up front in the preparation of a course. Therefore, it is important that the developed teaching context fits with the personal style of teaching while meeting the educational objectives (Bonwell and Sutherland, 1996). At the same time, however, our findings regarding specific active learning mechanisms could also give suggestions to general courses with a different set-up and lecturers with different styles of teaching. Students can be engaged in numerous ways via content-related presentations by students followed by discussions, general class discussions, peer feedback of work in progress assignments, linking theory and practice through involvement of practitioners and by encouraging self-directed learning via handing over some of the responsibilities such as deadlines, preparation for the course, etc. over to the students. Hence, we suggest that a varied set of learning/teaching methods at the course level may advance learning and contribute to the development of skill sets at the program level. This will help to close the gap between what practitioners require and what curricula set out to deliver.

Overall, we found that the book project course design offers unique opportunities to capture and integrate the various skills, competences and perspectives needed for SCM graduates. Therefore, we recommend further research on the link between the skills set that Purchasing (and broader SCM) practises require and the relevant teaching and learning contexts within which such learning can be achieved. Finally, we call for additional descriptions of, and reflections on, other novel course designs that can inspire colleagues around the world and by that advance SCM research, teaching and practice.

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