A Challenge-Based Experiment Aiming to Develop Strategic Thinking an Inquiry into the Role of Stimulating Creativity for out-of-the-Box Thinking

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Abstract

Drawing on the call for active learning in supply chain management, this paper's purpose is to describe and analyse how essential 'soft skills' learning outcomes are influenced by the learning and teaching contexts. An experimental case study of a master's level SCM course in which graduate students worked in projects resulting in jointly authored books and solving real-life cases. Students filled out surveys, self-assessing their 'soft skills' levels before and after the course. This study presents an educational 'soft skills' experiment that provides evidence that soft skills learning can successfully be implemented in existing SCM courses. The turbulence caused by digitisation and focus on sustainability issues changed the requirements of supply chain management (SCM) personnel. Machines are taking over processes and humans' contribution in the new era. Machines may act like humans but can only support humans in their 'creativity' and 'strategic thinking' but cannot replace humans' soft skills in this role. Learning objectives in SCM courses in higher education are evaluated for not covering soft skills. The literature states that higher education courses must contain common learning objectives that cover knowledge 'hard' skill and vital 'soft skills'. This study's outcomes imply that SCM interpersonal skills and intrapersonal traits can be developed significantly, which is essential to develop students from 'knowledgeable' to 'competent' candidates for the labour market.
Keywords: SCM, educational experiment, soft skills development

Introduction - soft skills gap in higher education

In the past decades, supply chain management (SCM) has shifted from an operational, transactional towards a highly strategic function (e.g. Bals, Schulze, Kelly, & Stek, 2019; Tassabehji & Moorhouse, 2008). Consequently, organisations outsourced non-core activities, which subsequently increased importance for supplier management, supply chain management and strategic decision-making (Schoenherr, 2010). Bals et al. (2019) confirm the SCM function's strategic focus and point at the effects of the Internet-of-Things and the sustainability, i.e. circularity and CSR related issues that affect SCM significantly. It has led to another palette of competences that SCM staff requires, i.e. a balanced mix of hard skills and soft skills (e.g. Saunders, Mann, & Smith, 2008), especially intrapersonal traits, like 'strategic thinking' (e.g. Bals et al., 2019) and 'creativity' (e.g. Kiratli, Rozemeijer, Hilken, de Ruyter, & de Jong, 2016).

Remarkably, there is evidence that most academic SCM courses and tracks have been evaluated for not or almost not learning and developing soft skills (Birou, Lutz, & Zsidisin, 2016; Wong, Grant, Allan, & Jasiuvian, 2014), i.e. interpersonal, communication, human-to-human skills and intrapersonal, character traits (Campion et al., 2011; Delamare-Le Deist & Winterton, 2005). Bals et al. (2019) argue that SCM lecturers in higher education should also introduce soft skills learning objectives that cover the context of future requirements *caused by the challenges of sustainability and the Internet-of-Things. Nonetheless, Fawcett and Rutner (2014) have found that SCM higher education is "not*

evolving at the pace and in the way expected by professionals" (Fawcett & Rutner, 2014, p. 181).

Thus, in higher education courses, a significant role is given to the transfers of knowledge and theory, and in parallel, academic courses are not equipped for the development of soft skills in the curricula. Interestingly, Ahmed, Fernando Capretz, Bouktif, and Campbell (2012) provided evidence that soft skills are as crucial as knowledge factors and professional skills (or hard skills) for professionals. Moreover, the lack of soft skills is more likely to be the reason for ending a labour relationship than a lack of knowledge (Ahmed et al., 2012). Soft skills are highly valued by employers and are necessary to carry out professional tasks or hard skills (Ahmed et al., 2012).

The increasing importance of intrapersonal character traits such as 'strategic thinking' and 'creativity' as proposed by Bals et al. (2019) and Kiratli et al. (2016) is in line with the findings Von der Gracht, Giunipero, and Schueller (2016). They researched future SCM skills of purchasers and foresaw existential threats in organisations. When in a "talent war" competitors recruit the most "creative and innovative minds" (Von der Gracht et al., 2016, p. 30). This finding is confirmed by Von der Gracht et al. (2018, p. 9) who found that machine-to-machine communication personnel needs to be "creative, productive and innovative" in the future era of machine-to-machine communication personnel. Hence, the right brainpower will be decisive in the era of the Internet-of-Things and artificial intelligence (AI): "To the extent that digital transformation is also transforming our society into a knowledge society, our economy could likewise change into a knowledge economy, or even into a 'human economy', where not only intellect but especially creativity, passion, character and team spirit will make the difference" (Von der Gracht et al., 2016, p. 10).

The conclusion is that humans are distinct from machines since humans possess creative, inventive skills that machines lack. The issue whether machines or AI can be 'creative' is countered by Du Sautoy (2019) in 'The Creativity Code: Art and Innovation in the Age of AI' with the understanding that instead of a replacement of human creativity by machines, AI will support and accelerate human creativity (Du Sautoy, 2019). Hence, the creativity and inventiveness of the human workforce will stay an essential factor.

Bals et al. (2019) underlined the importance of the full integration of all competences needed for the developing SCM function into higher and professional education and professional, industrial training programmes: knowledge, professional and interpersonal skills and a substantial set of intrapersonal traits. Moreover, Bals et al. (2019) highlighted that student-centred teaching methods should replace traditional, frontal teacher-centred methods "as current training and teaching methods are not necessarily suitable for developing all types of competencies, and the pedagogy needs to be adapted to reflect these requirements" and suggest: "in-class training formats such as role-plays and the potential for online courses and more interactive formats, e.g. blended learning or flipped classroom approaches" (Bals et al., 2019, p. 11).

In general, the question is how SCM research could address the complexity of the 21st century, especially those that concern students' education and training-practitioners. Can lecturers in academia influence students to actively develop these soft skills, or are these interpersonal skills and intrapersonal traits innate character features? Feisel, Hartmann, and Giunipero (2011) found that soft skills are difficult to influence.

Contrary, the research of Scholten and Dubois (2017) showed positive outcomes of an educational experiment.

As mentioned above, Bals et al. (2019) predicted the importance of soft skills development for SCM graduates and foresaw a shift from teacher-centred towards student-centred didactics. This aligns with Scholten and Dubois (2017, p. 1696), who found that students "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".

If soft skills and specifically, intrapersonal traits can be actively influenced, the question raises how these could be developed in higher education, i.e. with which didactics. Therefore, it leads to the following research question:

(RQ) which interpersonal skills and intrapersonal traits can be actively developed in SCM in higher education with which didactics?

Since the SCM competences literature is mostly focused on listing competences and has neglected to research the testing, experimenting and describing how future SCM education should be organised, this research fills this gap by presenting an educational experiment. The student-centred, learning-by-doing approach of Scholten and Dubois (2017) is adopted as part of this experiment. In this research, the evidence is given that in a time frame of 8 weeks, with a study load of 140 hours, interpersonal skills and intrapersonal traits can be developed within the context of a real-life case.

Therefore, an experiment was set-up in three cohorts of SCM graduates in a master course that takes a student-centred approach. The course was built upon three pillars: (1) "knowledge and theory"; (2) "professional skills"; and (3) "soft skills". For the first pillar, the teamed-up graduates wrote chapters for a joint book proposed by Scholten and Dubois (2017). Introductory (micro) lectures were provided, like academic writing support in tutorial meetings.

The second pillar consisted of solving a real-life case provided by the university's purchasing and supply management department. The written case description is kept concise. The student teams were invited to interview the cooperating university staff, such as the purchaser, the contract manager, the contract owner, the project leader, the sustainability officer, or the executive board's vice-president to acquire further information. Also here micro-lectures are provided.

The third pillar is overarching and focuses on developing soft skills, i.e. interpersonal, human-to-human, communicative skills and intrapersonal character traits. For this assignment, two surveys were taken, before and after the course, measuring the self-assessed competence levels on 36 soft skill items. The communication, teamwork, creative problem-solving in the writing and case projects served as the development basis. Furthermore, a Chief Purchasing Officer was invited for a workshop on ethical leadership and sustainability, and workshops on creativity, consultancy skills and negotiation were offered.

The outcomes provide evidence for the effectiveness of a student-centred approach in a course that offers the full construct of (1) knowledge and theory, (2) professional skills, and (3) interpersonal skills and intrapersonal traits development. Most soft skills improved significantly in the three cohorts of graduates in the SCM course. The

educational implication is that SCM higher education objectives must contain these three elements to develop 'competent' graduates for their future SCM jobs.

Theory on soft skills development and student-centred learning

The EU directives on higher education's role in soft skills development

Academia and higher education have to anticipate on future competences, since fostering innovation and creativity in society is a task for these institutions, according to the European ministers of education (Leuven/Louvain-la-Neuve Declaration, 2009). Moreover, the shift towards student-centred methods is promoted and endorsed by academia and higher education themselves via the European Association of Institutions in Higher Education (EURASHE) and the European University Association (EUA). They co-developed with the European ministers of education the standards and guidelines for quality assurance in the European higher education area (ESG Report, 2015).

The ESG Report state that: "Institutions should ensure that the programmes are delivered in a way that encourages students to take an active role in creating the learning process and that the assessment of students reflects this approach (…) Student-centred learning and teaching plays an important role in stimulating students' motivation, self-reflection and engagement in the learning process" ESG Report (2015, p. 12).

Hence, student-centred approaches are preferred, especially for the training of soft skills, attitudes or traits (e.g. Bals et al., 2019). Nevertheless, teacher-centred, frontal, and classical lectures can be considered the dominant higher education design for 'transferring' knowledge and theory (Hoidn, 2017). Multiple barriers cause the reason why universities are dominantly teacher-centred. Firstly, since dozens or even hundreds of students can attend the same lecture, teacher-centred methods are highly efficient, though not as effective as student-centred methods (Hannafin & Land, 2000). However, it is questionable whether a professional activity, such as education, can be efficient when effectiveness levels are lower. According to Drucker (1977), it is doubtful that a state of efficiency can be reached <u>before</u> effectiveness is established: "Effectiveness is the foundation of success – efficiency is a minimum condition for survival <u>after</u> success has been achieved. Efficiency is concerned with doing things right. Effectiveness is doing the right things" (Drucker, 1977, p. 33).

The learning effectiveness is hidden in learning, consisting of reconstructing bits of knowledge by students themselves. The learning process is not a 'transfer' of information from a lecturer directed towards the student; it is a genuine, personal process in the individual student's mind (Land & Hannafin, 2000).

The shift from frontal, classical teaching towards student-centred didactics is a profound change in working modus (Anthony & Kadir, 2012). Traditional lecturers who change their didactics to student-centred approaches report "feelings of guilt", because the student-centred method seems to be initially "just guiding and supporting the students in the learning processes" and knowledge is no longer "transferred" in a classical, frontal mode (Anthony & Kadir, 2012, p. 57). The guilt-feeling is caused by the wrongly expected loss of the lecturers' authority in the classroom when the lecture leaves behind the frontal, classical method (Anthony & Kadir, 2012).

Moreover, the learning and teaching of soft skills are more complicated. Laker and Powell (2011, p. 113) distinguish "hard-skills or technical training (working with

equipment and software) and soft-skills training (interpersonal or intrapersonal focus)" and found evidence that the soft skills learning process is associated with higher levels of resistance from both, the students/trainees and the management. Soft skills training has not as direct applicability to the job as hard skills training. Further, soft skill learning results in a lower degree of achieved proficiency and self-efficacy. Moreover, the preciseness of identifying soft skills training objectives is lower (Laker & Powell, 2011). This lower level of preciseness might also be the case for the identification of training methods.

The SCM competence literature has presented important competences (e.g. Bals et al., 2019; Cousins, Lawson, & Squire, 2006; Giunipero & Pearcy, 2000; Knight, Tu, & Preston, 2014; Tassabehji & Moorhouse, 2008), but has failed to present best practices on how these competences could be taught best. Whereas Feisel et al. (2011) found that these intrapersonal traits of experienced professionals and their strategic behaviour are difficult to influence, the research of Scholten and Dubois (2017) showed, however, the positive outcomes of an educational experiment in cohorts of students in an SCM course as is shown after the next section.

The SCM competence literature hardly provides outcomes of didactical experiments on the topic of how to apply the necessary soft skills and especially intrapersonal character traits in SCM courses in higher education. The question arises whether the prevailing conceptualisation of SCM is capable of comprising the 21st century's complexity since the research community seems not to absorb the right instruments to cope with the contemporary and the future challenges in the field (e.g. Carter, Rogers, & Choi, 2015; Darby, Fugate, & Murray, 2019; Knight, Meehan, Tapinos, Menzies, & Pfeiffer, 2020).

Teaching approaches in higher education

Due to changing labour market demands, higher education must anticipate by adjusting the learning objectives early (Hoidn, 2017). Expectations are that in 2025 about 45 per cent of the European jobs will require high-level qualifications and another 45 per cent will need medium-level qualifications. After graduation, students need the "ability to apply knowledge and skills flexibly in different contexts", and academia has to prepare "students with the subject-based know-how as well as with high-level transversal competences and skills such as joint problem solving, critical thinking, and self-regulated learning" (Hoidn, 2017, p. 2).

To summarise the advantages and constraints mentioned above: teacher-centred approaches are indeed more cost-efficient, however not so effective as student-centred methods (Hannafin & Land, 2000). A shift from teacher-centred to student-centred didactics is a profound change of working modus that causes guilt feelings when losing authority when not following frontal, classical didactics (Anthony & Kadir, 2012). Moreover, students or trainees and their management less appreciate soft skills training. Traditionally, lecturers at (European) universities use, classical, frontal lecturing for 'transferring' knowledge and theory (Hoidn, 2017). The design of frontal teaching sets students in a passive, listening role, which has the lowest effect on retaining knowledge (Masters, 2013) for which Poh, Swenson, and Picard (2010) even has provided empirical evidence.

Poh et al. (2010) measured a student's neurological activity over seven days with a device, a 'wearable sensor for unobtrusive, long-term assessment of electrodermal

activity'. Poh et al. (2010) show that most neurological activity is found with the student during self-study, doing homework, doing laboratory work, exams, and sleeping (dreaming). Lesser brain activity is found during watching television, relaxing and remarkably when following lectures in the classroom. Hence, for the student, having a classical, frontal lecture in most cases has the same neurological impact as watching television or remaining in a relaxing state of mind.

Poh et al. (2010), illustrate that the process of learning consists of the reconstruction of bits of knowledge by students themselves; the learning process is not a 'transfer' of information from a lecturer directed towards the student (Land & Hannafin, 2000). De Houwer, Barnes-Holmes, and Moors (2013, p. 633) define learning as 'ontogenetic adaption', i.e. "as changes in the behavior of an organism that are the result of regularities in the environment of that organism".

Nevertheless, Hannafin and Land (2000) found that many lecturers in higher education are convinced that they could transmit the knowledge they possess to the individual students. Yet, there is broad agreement that the students have to reconstruct knowledge individually (Hannafin & Land, 2000). In line with that, the European Commission in 2008 already noted that "traditional teaching approaches based on direct instruction or lecturing are no longer adequate" and that they have to be "replaced by more learner-focused models that are based on the learner's active involvement in the process of reflection and interpretation" (Hoidn, 2017, p. 5). A way to activate students in their learning process to reach a comprehensive learning effect is the active involvement in experiments. Active involvement has better learning results than students who passively watch the same similar experiment demonstrated by a lecturer (Bonwell & Eison, 1991).

Towards a student-centred approach

Student-centred learning environments are a better alternative to the dominant design of classical, frontal instruction. The introduction refers to the ESG-standards from the year 2005 (ESG Report, 2015). The conclusion is that European higher education's educational methods are still not in line with the ESG-standards (Hoidn, 2017), although academia and higher education institutions were involved via the EURASHE and the EUA.

As mentioned, in SCM, not many experiments with knowledge transfer, interpersonal skills and intrapersonal traits development are described in the academic literature. A rare example is an attempt to train students' competences performed by Scholten and Dubois (2017) from 2008 to 2015. In subsequent cohorts at a Swedish and a Dutch university, case study projects have been performed in which SCM master students were assigned to project groups on writing a joint e-book on SCM.

The main conclusion is that "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" (Scholten & Dubois, 2017, p. 1683).

Scholten and Dubois' (2017) approach is a method for developing cognitive, interpersonal and intrapersonal skills of both students and lecturers. Scholten and Dubois (2017, p. 1696) conclude that for student-centred approach educators need other lecturing skills: "due to students' active involvement in decisions regarding content and process, a lot of flexibility and creativity is required from individual

lecturers," and they add: "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" (Scholten & Dubois, 2017, p. 1696).

Compared to the traditional, classical way of lecturing methods, the method, as explained by Scholten and Dubois (2017) is more in line with the Dublin descriptors (Dublin Descriptors, 2004). These descriptors are part of the Bologna Process and are supposed to be endorsed by all European institutions of higher education. The Dublin descriptors state that learning objectives in general consists of both hard and soft skills: "(i) knowledge and understanding, (ii) applying knowledge and understanding, (iii) making judgements, (iv) communication skills and (v) learning skills" (Dublin Descriptors, 2004; Leoni, 2014, p. 4).

Concluding, in higher education classical, frontal teacher-centred lecturing is the dominant design, and the teaching is mostly focused on the transfer of knowledge and hard skills (Masters, 2013). The literature underlines the importance of soft skills development at universities and institutions for higher education. Therefore, based upon Scholten and Dubois (2017) and Laker and Powell (2011), the following is hypothesised:

Hypothesis: soft skills (interpersonal skills and intrapersonal traits) can be developed in SCM courses in higher education with learning-by-doing practices.

Methodology – quasi-experiment with intrapersonal skills in an SCM course

Research design - one-group pre-test – post-test design

In this study, an experimental approach is pursued. It is following the call of Pettigrew (2001) for a form of 'management research after modernism' to "be prepared for a period of experimentation and learning" (Pettigrew, 2001, p. 69). As mentioned, Darby et al. (2019, p. 1) calls for an "expanding the methodological toolbox" of SCM and alert not to use just a sheer observative, sociological positivist approaches. This plea of Darby et al. (2019) can be associated with Hacking (1984, p. 154), who stated that: "no field in the philosophy of science is more systematically neglected than experiment."

The design of measurement in education is normally a pre-experimental design that is "the exposure of a group to an experimental variable or event, the effects of which are to be measured," (X) followed by "some process of observation or measurement" (O) (Campbell & Stanley, 1966, p. 6). Hence, the standard set-up in education is X-O, mostly being a series of lectures followed by a test referred to by Campbell and Stanley (1966, p. 6) as "the one-shot case study". For this research, an O_1-X-O_2 design has been set-up, or "the one-group pre-test – post-test design", which is preferred over an X-O design and "to be worth doing where nothing better can be done" (Campbell & Stanley, 1966, p. 6), which is the case, although a design with a control group would have been a better alternative. In that case, the focal group would perform the surveys and follow the lectures (O_1-X-O_2), and the control group would only perform the surveys (O_1-O_2). Since there was no access to a control group, "pre-test – post-test control group design" could not be performed (Campbell & Stanley, 1966, p. 6). The O_1-X-O_2 design in this study consisted of two identical surveys O_1 and O_2 and a 5 ECTS course (140 hours of

study load) with lectures, workshops, case study, academic writing, and self-study between both surveys.

The used method to assess the difference between O_1 and O_2 is the Paired-Samples or Dependent *t*-test for which the Confidence Interval Percentage is set on 95 per cent. The missing values are set to be "excluded by analysis". The students filled out the first survey before the end of the first week of the ten-week course. The same students filled out the second survey before the end of the last week of the course. The 'mean' results from subtracting the different items' outcomes in the second survey form the first survey. Both surveys were measured on a 5-point-Likert scale from "fully disagree" to "fully agree". Moreover, Cohen's d effect sizes are calculated. The effect size are considered to be 'small' (.2<*d*<.5); 'medium' (.5<*d*<.8); or 'large' (.8<*d*<1.2) by Cohen (1988, pp. 25-26).

Course design in three lines: knowledge, skills and attitudes/traits

The researched sample consists of business master students of an elective, introductory SCM course at a Dutch polytechnical university. The master course has been designed in such a way that it offered education in (1) knowledge and theory; (2) professional and interpersonal skills; and (3) intrapersonal traits. The didactical construct offered a mix of frontal, classical instructions, practical workshops, storytelling and 'learning-by-doing' in two larger projects with tutoring meetings.

The course attracted 95 students (30 females and 65 males; 82 Dutch students, seven citizens from other EU-countries and four from non-EU countries) in three subsequent cohorts in 2018-2019 (30 students: 8 females and 22 males; average age 23.7, δ=1.75); in 2019-2020 (26 students: 12 females and 14 males; average age 23.0, δ=1.06); and in 2020-2021 (39 students: 10 females and 29 males; average age 24.3, δ=2.52). The students were mostly enrolled at the master track Industrial Engineering Management and Business Administration. However, also, other business students were registered. The course consisted of about 16 lectures and workshops of 90 minutes and was divided into three lines: a knowledge line, a skills line and an attitude or intrapersonal traits line.

The knowledge line's practical substance consisted of an assignment to the students to co-author a book entitled 'State of the Art of Purchasing and Supply Management', inspired by Scholten and Dubois (2017). Teams were formed of about three students and were assigned to write a scientific paper, i.e. book chapter on an SCM topic. At universities in the Netherlands, lecturers usually leave the initiative with the students to team-up in groups. In most cases, this appears to lead to mono-cultural teams of acquainted students, which would not necessarily represent the daily practice in these graduates' future professional lives; usually, professionals cannot pick their fellow team members.

For each book chapter assignment, a topic and some guidance were given, such as two or three crucial articles on the topic and how to start academic writing. The assignment urged to use the most recent literature and to cite at least 15 peer-reviewed articles. The use of annotation program EndNote was set obligatory. Each student group was invited at least twice to meet 30 minutes with the lecturer to structure and improve the paper writing process. After the deadline and the lecturer's final editing, the book with a dozen chapters was made available in pdf-format via intranet and was handed out in hard copy during the open-book-exam. The student groups presented their chapter in a 15-minutes PowerPoint presentation during the final lectures.

For the skills line, the students were again teamed up by the lecturer, however in other groups than for the book chapter writing assignment. The reason for that is twofold. Firstly, it is unlikely that professionals can form their team or be consigned to two identical teams in professional life. Secondly, teaming up in different teams avoided the exchange of tasks between students, leading to freeriding in one of the projects.

Real-life case studies were co-developed with the purchasing department of the university. The cases regarded the public tender procedures of tenders that would be carried out a few months later by the purchasing department. In the different lectures in the subsequent academic years, workshops were organised with guest speakers, such as chief purchasing officers (CPOs) and purchasing experts.

In the case kick-offs, the university purchasers, contract owners and contract managers had a role. The case studies have been designed to be easily explained: e.g. 'the university needs new faculty housing' or 'the contract of the hot beverages vending machine is ending' and 'a tender procedure is upcoming'. Nevertheless, these 'simple' problems were hard to solve due to all the facets, like stakeholders' interest, sustainability issues, et cetera. The case studies were subtitled 'talking with *real* people'. Therefore the written info in the case study assignments was limited. The students were invited to raise oral questions to obtain more information from the purchasers, contract-owners, contract-managers, project managers, and the executive board's vice-president, who are the professionals who would work on the same case in real-life in the following months. These university practitioners cooperated for different reasons. One reason is the willingness to contribute to the university's educational process and stay connected to the employers' core business. Another even more important reason is exchanging ideas with the students, the guest speakers and the lecturers, to get insights from a new angle and obtain synergy advantage in the upcoming tender procedures.

For both the knowledge and the case line, in 2018 and 2019, classical and in 2020, due to the COVID-19-lockdown, online, frontal instruction lectures were provided on topics like public procurement procedures and the selection and awarding; purchasing and supply chain management; supplier selection; and innovation sourcing. In the attitudes or intrapersonal traits line, several workshops were provided, such as a CPO's workshop on ethical behaviour and sound leadership; a workshop of an interim management and consultancy agency on consultancy skills and other necessary skills in a purchasing consultancy job; a negotiation lecture and workshop.

The third line in the course regarded the development of attitudes or intrapersonal traits. For this line, the one-group pre-test – post-test design experiment is performed in an O_1-X-O_2 design, whereas O_1 (observation 1) represents the first survey that was held in the first week of the course; X (exposure) represents the exposure to the group work and the soft skills training; and O_2 (observation 2) represents the second survey that is identical to the first and was held in the last week of the course.

The survey consisted of 36 interpersonal skills and intrapersonal traits with a five-point Likert-scale ("fully disagree" to "fully agree"). The 36 interpersonal and intrapersonal skills (see: the appendix) were derived from Giunipero (2000), Giunipero and Pearcy (2000), Knight et al. (2014), Schiele (2007) and Heyse, Erpenbeck, and Max (2004). The first survey in the three cohorts was taken before the second lecture, and the second survey was taken after the final lecture. The first survey's results were kept unrevealed for the individual students until after filling out the second survey.

Therefore, when filling out the second survey, the individual students were unaware of their initial scores in the first survey about eight to ten weeks earlier. After the course, students compared their scores and handed in a reflection on the course, including a personal development plan. For the analysis, Paired Samples or Dependent t-tests were performed. For the surveys, ethical approval was received from the Ethics Committee of the university, and all students approved the use of anonymised data for scientific use.

Results – an increase of levels of interpersonal skills and intrapersonal traits

The results of both surveys or observations O_1 and O_2 in terms of Campbell and Stanley (1966) were subject of Dependent t-tests. In total, 26 items showed a significant difference, and ten did not, as is displayed in table 1. Herewith an answer is given on the research question on which soft skills can be developed. Moreover, there is enough evidence <u>not</u> to reject the hypothesis; indeed, the evidence is found for a substantial number of soft skills that these can be developed in a relatively short time frame of a ten-week course of 5 ECTS with the described didactics: a mix of frontal, classical instructions, practical workshops, storytelling and 'learning-by-doing' in two larger projects with tutoring meetings.

The course was successful in increasing 'strategic thinking', 'negotiation skills' and 'sellership skills' with significant p-values (p < 0.01) and 'medium' Cohen's d effect sizes (.5<d<.8) (Cohen, 1988, pp. 25-26; Sawilowsky, 2009). 'Strategic thinking,' has the strongest effect size, meaning that the progress that the student sample made for this survey item is significant (p < .000) and with a 'medium' effect size (Cohen, 1988, pp. 25-26; Sawilowsky, 2009). 'Strategic thinking' was part of the case study's learning objectives; a lecture and workshop in strategic management were part of the case. The first assignment in the case consisted of forming a vision on higher education development in the next decades to define the building's purpose on the university campus.

'Negotiation skills' improved significantly, and the effect size is 'medium' (p=.000; d=.636) (Cohen, 1988, pp. 25-26; Sawilowsky, 2009). 'Negotiation skills' are explicitly practised during the negotiation workshop. 'Sellership Skills' has a significant outcome with a medium effect size (p=.000; d=.538).

Furthermore, the course improved networking, teamwork, leadership, problem-solving, cross-functional management, communication skills and the capacity to be empathic to a lower extent, showing lower significances (.01<p<.05) and smaller effect sizes. Cohen's d effect sizes in these cases are 'small' (.2<d<.5) (Cohen, 1988; Sawilowsky, 2009).

Table 1 - Effect sizes of significant differences O_1 and O_2 interpersonal and intrapersonal skills levels in a Paired-Samples or Dependent t-test

		Survey scores		Paired Differences				
		Survey 1	Survey 2	Mean	SD	t-value	Sig. (p-value 1-tailed)	Cohen's d
1	**Strategic Thinking**	2,70	3,21	.518	.713	5.433	**.000**	**.726**
2	**Negotiation skills**	2,21	2,71	.500	.786	4.759	**.000**	**.636**
3	**Sellership skills**	2,36	2,80	.446	.829	4.028	**.000**	**.538**
4	*Networking / Building Relations*	2,49	2,86	.351	.772	4.409	**.000**	.455
5	*Communication skills*	3,06	3,34	.362	.914	3.837	**.000**	.396
6	*Decision-making*	2,83	3,16	.309	.804	3.722	**.000**	.384
7	*Cross-functional management*	2,86	3,23	.391	.828	3.772	**.000**	.472
8	*Ability to Solve Problems*	3,13	3,38	.277	.768	3.493	**.000**	.360
9	*Comprehension of Complexity*	2,95	3,19	.245	.683	3.474	**.000**	.358
10	*Capacity to be empathetic*	3,34	3,66	.339	.721	3.524	**.000**	.470
11	*Leadership/community management*	2,51	2,89	.359	.824	3.491	**.000**	.436
12	*Flexibility and agility*	2,79	3,07	.277	.835	3.212	**.001**	.331
13	*Creativity*	2,60	2,83	.213	.670	3.079	**.001**	.318
14	*Inventiveness*	2,58	2,86	.277	.873	3.073	**.001**	.318
15	*Persistence*	2,70	3,04	.339	.837	3.033	**.002**	.405
16	*Proactivity*	2,87	3,10	.213	.731	2.821	**.003**	.279
17	*Teamwork*	3,17	3,47	.313	.889	2.813	**.003**	.351
18	*Cross-cultural awareness*	2,86	3,06	.245	.876	2.708	**.004**	.279
19	*Willingness to take risks*	2,83	3,14	.191	.766	2.424	**.009**	.250
20	*Customer-oriented*	3,14	3,27	.191	.846	2.195	**.015**	.226
21	*Stress management*	2,98	3,16	.297	1.122	2.116	**.019**	.265
22	*Willingness to Learn*	2,87	3,02	.160	.780	1.983	**.025**	.204
23	*Capacity to Advice*	2,87	3,03	.181	.904	1.941	**.028**	.200
24	*Holistic Thinking*	3,11	3,28	.149	.747	1.933	**.028**	.199
25	*Poise*	2,66	2,80	.149	.747	1.933	**.028**	.199
26	*Task management*	3,38	3,47	.219	.917	1.909	**.030**	.239
27	Power of Persuasion	2,95	3,12	.143	.699	1.530	.066	.204
28	Result-orientated action-taking	2,94	3,05	.128	.688	1.422	.079	.147
29	Self-assurance	2,73	2,94	.106	.809	1.274	.103	.131
30	Inter-generation skills	2,96	3,09	.156	.996	1.256	.107	.156
31	Honesty	3,67	3,74	.096	.804	1.154	.126	.119
32	Conscientiousness	3,47	3,50	.125	.833	1.124	.133	.150
33	Social Manners	3,32	3,32	.096	.881	1.054	.147	.108
34	Ability to Resolve Conflicts	3,21	3,27	.096	.928	1.000	.160	.103
35	Critical thinking	3,15	3,25	.107	.867	0.925	.180	.124
36	Loyalty	3,69	3,77	.053	.884	0.583	.281	.060

See the appendix for the item's definitions. The sample of consists of Business Administration and Industrial Engineering and Management Master students (n=94) in the cohorts 2018-2019 (n=30); 2019-2020 (n=26); and 2020-2021 (n=38) of the introductory course Purchasing Management at the University of Twente. Used method: Paired t-test; Confidence Interval Percentage: 95 per cent; Missing Values: Exclude cases analysis by analysis (Cohen, 1988, pp. 25-26; Sawilowsky, 2009).

Discussion and conclusion – contextual fundament for attitudes / intrapersonal traits development

In the *one-group pre-test – post-test,* the students filled out identical surveys before and after the course and self-reported their skills levels in 36 skills as displayed in table 1. The research question is*: which interpersonal skills and intrapersonal traits can be actively developed in SCM in higher education with learning-by-doing with which didactics?*

The course caused a significant difference in 'strategic thinking,' which is a relatively, lower-ranked item in the students' sample mean. On a 5-point Likert scale, the students' mean in O_1 was 2.70, and in O_2 it increased to 3.21. The impact of the course is considerable but should not be exaggerated. The course has played a role in developing

students' cohorts from a lower level towards a more average strategic thinking level and certainly not to an excellent level. The listing of 36 competence items 'strategic thinking' was ranked 29 in O_1 and O_2 it increased to rank 15 (see the appendix). 'Sellership skills' and 'negotiation' remained at respectively rank 35 and 36.
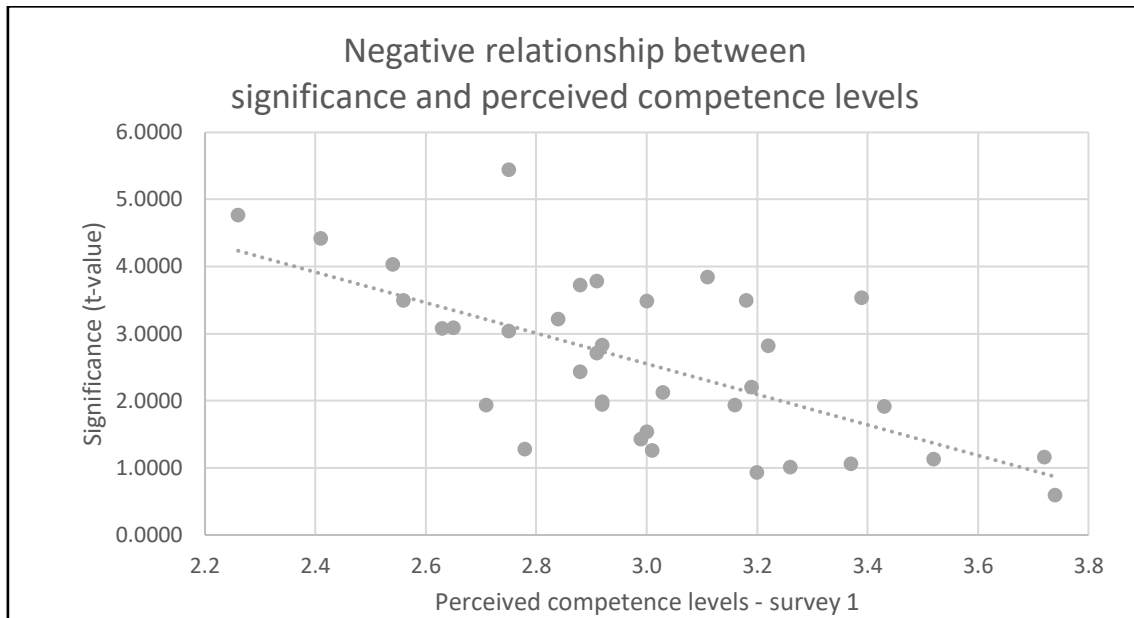

Figure 1 – Graph displaying the negative relationship between the perceived competence levels in survey 1 (O_1) and the significance of the progress in perceived competence levels from survey 1 (O_1) to survey 2 (O_2) ($R^2 = .402$)

Table 2 – Regression output belonging to figure 1

	Coefficients [a]				
	Unstandardised Coefficients		Standardised Coefficients		
	B	Std. Error	Beta	t	Sig.
(Constant)	9.265	1.410		6.573	.000
Perceived competence level (survey 1)	-2.276	.476	-.634	-4.781	.000

a. Dependent Variable: Significance of progress (t-values)

Therefore, the initially lower-ranked competences are more likely to be subject to improvement. It is not surprising that the survey items with a higher self-rated competence level cannot be improved as those items with lower self-ratings, since the first set of items are developed, and the latter are underdeveloped. In other words, the proverbial *low-hanging fruit* is found in lower self-rated competences. Figure 1 the two rankings of the 36 competence items displayed in a scatter plot: the ranking in *t*-values from low to high and the ranking of the perceived competence level from low to high on the 5-point Likert scale. The trendline reveals a negative relationship between both. Hence, the lower the initially perceived competence level, the higher the chance on a

significant improvement. Table 2 shows evidence that the slope of the regression is significant (p=.000). The R^2 is .402.

Remarkably, two forms of thinking, 'critical thinking' and 'strategic thinking, ' represent the second lowest and the highest significance and effect size. Moreover, 'critical thinking' is perceived as a top-10 ranked competence with the surveyed students, whereas 'strategic thinking' is ranked amongst the lowest ten. In the four to five years of academic training (and over ten years of elementary and secondary school education), the students stated that they developed critical thinking. Strategic thinking, however, appeared to be underdeveloped.

Therefore, students could be more familiar with the term 'critical thinking' since they might have been primed with the notion that 'critical thinking' is a desirable objective for a student in general. In literature, there is a discourse on 'thinking'-learning objectives, like 'critical thinking', 'academic thinking' et cetera. The discourse is led by Willingham (2008) who questions whether critical or other kinds of specific thinking are skills on its own: "If you remind a student to 'look at an issue from multiple perspectives' often enough, he will learn that he ought to do so, but if he doesn't know much about an issue, he can't think about it from multiple perspectives" (Willingham, 2008, p. 21). Willingham (2008) pleas for critical or other specific thinking in a given context, which is in line with Delamare-Le Deist and Winterton's (2005) definition of competence as a construct of three elements, knowledge, skills, abilities and other characteristics.

'Strategic thinking' is a skill that employers appreciate (Bals et al., 2019). The literature shows that attitudes and intrapersonal traits as 'strategic thinking' are hardly taught in academia (Birou et al., 2016; Wong et al., 2014). However, this course was directed on the strategic purchasing management theory and urged the students to think about strategic SCM-related problems. Hence it provided a context to the thinking process; it deliberately combined knowledge, professional and interpersonal skills, and intrapersonal traits.

Competence items that were not foreseen in the set of learning objectives for the introduction course to Purchasing Management, such as 'sellership skills' and the 'willingness to take risks' are remarkable. However, the modern purchasing and supply chain managers need this kind of entrepreneurial skills, aligning Giunipero and Pearcy (2000). Other significant unintended improvements are 'persistence', 'proactivity', 'teamwork' and 'cross-cultural awareness'. Evidence is provided that 'teamwork' skills can be improved significantly with a sample of master students familiar with working in student groups. The standard procedure is that students form teams. Yet, in this case, they were assigned to groups instead of form groups, i.e. to continue in old structures.

As stated in the introduction, the transfer of knowledge and theory has a significant role in higher education. Indeed, the importance of knowledge and theory is undeniable. However, soft skills are necessary to carry out professional tasks (Ahmed et al., 2012). Moreover, employers highly value soft skills, and the lack of soft skills is more likely to be the reason for ending a labour relationship than a lack of knowledge (Ahmed et al., 2012).

For the operationalisation of strategic management knowledge and theory, strategic thinking or strategic handling is needed. In strategic management courses, students are taught strategic management knowledge and theory (which was also done in the described course). However, in most of these courses, the business students are not taken to the next level of carrying out strategic management and lack competences in

strategic thinking. In line with Saunders et al. (2008), Delamare-Le Deist and Winterton (2005) show that knowledge, skills and attitudes form an undividable triangle, and Willingham (2008) expresses that attitudes and traits should be developed within a context (of knowledge and theory).

Giunipero (2000) distinguishes between hard skills (SCM knowledge and skills) and soft skills (intrapersonal traits and intrapersonal traits in SCM). A "world-class purchaser" is "continuously improving his/her skills; (…) is focused on professional development and education; (…) is willing to change and adapt; is a problem solver seeking the best solution; is flexible; (…) is ethical; (…)" and "adapts well to change" (Giunipero, 2000, p. 8). Hence within the SCM context as suggested by Willingham (2008).

The RQ1 is focused on which soft skills '*could*' be developed. Like is hypothesised, the evidence is shown that soft skills can be trained, which is confirmed by Scholten and Dubois (2017), who found that a student-centred approach leads to *"higher-order learning in relation to content as well as skills that are needed in today's job environment"* (Scholten & Dubois, 2017, p. 1696). It also aligns with Laker and Powell (2011), although soft skills training comes with higher resistance levels from participants and their managers. Hence, the question of whether soft skills '*could*' be taught is answered. Nevertheless, Laker and Powell's (2011) findings trigger whether, in academia, soft skills *should* be taught. Employers would agree as shown by Ahmed et al. (2012) and many scholars in the SCM competence field (e.g. Bals et al., 2019; Feisel et al., 2011; Giunipero, Handfield, & Eltantawy, 2006; Giunipero & Pearcy, 2000). The European ministers of Education also would agree, according to the statement that: "Higher education should be based at all levels on the state of the art research and development thus fostering innovation and creativity in society" (Leuven/Louvain-la-Neuve Declaration, 2009, p. 4).

Interestingly, many parties would agree that soft skills, more precisely intrapersonal traits learning objectives '*should*' be applied in academic courses, most notably the employers, politicians and SCM scholars. Nevertheless, academia failed to offer a balanced volume of knowledge and theory, professional and interpersonal skills and intrapersonal traits. Hence, soft skills '*could*' and '*should*' be taught in higher education, but they are absent when it comes to learning objectives. It raises the question of whether soft skills '*would*' be taught in academia. Soft skills education is less attractive for all stakeholders. Students, trainees, and management seem to prefer hard skills over soft skills education (Laker & Powell, 2011) and lecturers feel guilty when shifting to student-centred methods (Anthony & Kadir, 2012).

From the student evaluations, it became clear that the course was mostly positively evaluated and was experienced as 'different from other courses'. Remarkably, the students in the cohort 2020-2021 that due to the COVID-19-measurements, followed most of the lectures online, appreciated the course better than the preceding cohorts. Nevertheless, the most common asked question by students (and colleagues) is how soft skills development is evaluated. Knowledge and professional skills can be tested in an exam or assignment. Soft skills indeed require another evaluation method and didactics.

The learning of knowledge, skills and traits was facilitated in the course, whereas regular courses focus only on knowledge and theory (Birou et al., 2016). The students revealed that they usually would start to study the lecture notes and PowerPoint presentations a week or two before the exams. In this course, the students studied the

notes in an earlier stage because the knowledge formed the context of the case or the book chapter. Here, the evidence is provided that the course followed Willingham's (2008) call for a contextual basis to develop specific thinking forms. Moreover, with the outcomes of Poh et al.'s (2010) research in mind, regarding the intrapersonal traits, the course content seems to have caused 'neurological activity' within the students' brains.

Limitations and further research

Indeed, the course might have caused 'neurological activity', i.e. some form of learning. The first limitation of this study that it is questionable, whether learning as 'ontogenetic adaption' occurred as meant by De Houwer et al. (2013, p. 633), who defined learning "as changes in the behavior of an organism that are the result of regularities in the environment of that organism".

This study's second limitation is the quasi-experimental or pre-experimental character (Campbell & Stanley, 1966). Campbell and Stanley (1966) note that an O_1-X-O_2 design comes with internal validity problems. Mostly, the 'history' forms a threat to validity. "Between O_1 and O_2 many other change-producing events may have occurred in addition to the experimenter's X" (Campbell & Stanley, 1966, p. 6). In this study a one-group pre-test – post-test design experiment is performed in three cohorts of students in an elective, introductory SCM course for the master curriculum Industrial Engineering Management in which also master students in the Business Administration track are enrolled. Parallel to the course, the participating students followed in the same period, on average, two other courses that might have affected the second survey outcomes (O_2).

Consequently, the quasi-experiment was not performed with a parallel group of students in another traditional course that has not incorporated interpersonal skills and intrapersonal traits development in the learning objectives. The results show an increase in some interpersonal and intrapersonal skills. It is uncertain whether this increase was gained due to the course's specific learning objectives and training methods. Thirdly, the increase between survey O_1 and O_2 could be due to other, parallel courses in the curriculum or other private life circumstances. Some students stated that becoming conscious of the competence level caused differences between the two surveys, known as the Dunning-Kruger effect (Kruger & Dunning, 1999).

Fourth, the course consisted of three cohorts of only 95 students of an elective introduction course to SCM, which is a limited sample size. Fifth, after having gotten information about the course's first lecture, usually a dozen students signed out for different reasons. In some cases, the required courses' timetables interfered with this elective course, and students express that they did not like the course design. Hence, after the introduction course, only interested students stayed in the course, which may be seen as a respondent's bias and probable convenience sampling.

Sixth, the majority, 82 of the 95 students (86 per cent), has a Dutch nationality, which might have caused cultural bias (Cagliano, Caniato, Golini, Longoni, & Micelotta, 2011; Chipulu et al., 2014; Pagell, Katz, & Sheu, 2005). Seventh, another potential limitation could be a social-desirability bias, i.e. that (some) students might have anticipated and replied having developed (some) skills in the course and therefore replied differently in the second survey, however, as mentioned, the outcomes of the first survey were not disclosed before filling out the second survey.

Further research is suggested by replicating this study to test if the same results can be reached in other (cultural) circumstances. Moreover, it would be recommendable to distinguish in further research the most critical or necessary interpersonal and intrapersonal skills that lead to SCM success and replicate this study with a redesigned course and subsequent learning objectives.

This research shows that soft skills *'could'* and *'should'* be taught in higher education. Feisel et al. (2011) found that soft skills development with experienced staff is 'difficult'. It aligns with Laker and Powell (2011) who found that trainees and management prefer hard skills over soft skills education, but are absent when it comes to learning objectives. This study's result that master students are easily influenced in their soft skills development raises the questions whether these findings are generalisable and apply for SCM staff. Futher research is needed to determine this.

The 'methodological toolbox' should not be restricted to a sheer observative, positivist research (Chicksand, Watson, Walker, Radnor, & Johnston, 2012; Darby et al., 2019; Knight et al., 2020; Pettigrew, 2001); SCM educational research would benefit from active scholarly involvement in the complex challenges the field is facing regarding digitisation , CSR and sustainability.

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Appendix - Rankings of the items in the two student surveys

		Mean		Mean	
		O_1	δ	O_2	δ
1	**Loyalty** - Being loyal in professional life	3.69	.813	3.74	.829
2	**Honesty** - Being trustworthy in professional life	3.67	.706	3.77	.739
3	**Conscientiousness** - Conscientiousness implies a desire to do a task well, and to take obligations to	3.38	.776	3.50	.874
4	**Result-orientated action-taking** - Aiming on effectiveness	3.34	.738	3.47	.813
5	**Capacity to be empathetic** - Capacity to listen and understand	3.32	.741	3.66	.769
6	**Social Manners** - Being tactful, diplomatic and having organisational sensitivity	3.21	.849	3.32	.806
7	**Ability to Resolve Conflicts** - Being able to avoid and resolve conflicts	3.17	.808	3.27	.894
8	**Teamwork** - Being able to work in a group of persons, acting together as a team	3.15	.755	3.47	.755
9	**Critical thinking** - Having the skills and knowledge of how to assess problems or issues in a critical	3.14	.819	3.25	.837
10	**Willingness to Learn** - Being professionally curious, motivation to learn continuously	3.13	.775	3.27	.764
11	**Ability to Solve Problems** - Being able to solve problems in a systematic way	3.11	.722	3.38	.705
12	**Task management (priority management)** - Being able to make a prioritisation in business-related	3.06	.882	3.28	.745
13	**Communication skills** - Having the skills and knowledge of how to communicate	2.98	.825	3.34	.849
14	**Capacity to Advice** - Having consultancy skills	2.96	.886	3.16	.766
15	**Inter-generation ability** - Being aware of and able to work with people from different generations	2.95	.909	3.09	.988
16	**Comprehension of Complexity** - Being able to understand and solve complex problems	2.95	.674	3.19	.692
17	**Self-assurance** - Being assertive and having self esteem	2.94	.783	3.05	.872
18	**Cross-cultural awareness** - The ability to become aware of cultural values, beliefs and perceptions of yourself and other cultures	2.88	.955	3.12	.914
19	**Holistic Thinking** - Holistic thinking involves understanding a system by sensing its large-scale patterns and reacting to them	2.87	.640	3.02	.747
20	**Poise** - Being (self) confident	2.87	.802	3.03	.822
21	**Proactivity** - Being anticipatory, change-oriented and self-initiated behaviour in situations	2.87	.789	3.10	.804
22	**Customer-oriented** - being oriented on the end user	2.86	.766	3.06	.814
23	**Cross-functional management** - Being able to work with people from other professions and functions	2.86	.704	3.23	.707
24	**Decision Making** - Being able to make decisions	2.83	.767	3.16	.807
25	**Stress management** - Know how to manage stress at home and work using a variety of techniques	2.83	.977	3.14	.833
26	**Flexibility and agility** - Being able to adjust one's behaviour to new information or changing	2.79	.742	3.07	.737
27	**Willingness to take risks** - Taking well considered risks	2.73	.805	2.94	.773
28	**Persistence** - Continuing in an opinion or course of action despite difficulty or opposition	2.70	.829	3.04	.738
29	**Strategic Thinking** - Strategic thinking is a process that defines how people think about, assess, view, and	2.70	.829	3.21	.780
30	**Power of Persuasion** - Having influential skills	2.66	.721	2.80	.699
31	**Creativity** - Being creative in professional life / having creative ideas	2.60	.880	2.83	.771
32	**Inventiveness** - Being able to convert creative ideas in practice	2.58	.752	2.86	.756
33	**Leadership / community management** - Being able to manage employees in teams	2.51	.812	2.89	.819
34	**Networking / Building Relations** - Networking and relations management	2.49	.836	2.86	.863
35	**Sellership skills** - Having acquisition strength and having canvassing ability	2.36	.883	2.80	.942
36	**Negotiation skills** - Being able to negotiate the specific commercial and legal terms in a contract needed to be settled in a satisfactory way for your organisation	2.21	.825	2.71	.780

Notes: O_1 is the first survey held in the first week of the course; O_2 is the second survey, taken after the course; the items were measured on a 5-point Likert-scale (fully disagree to fully agree.