Routledge
Taylor & Francis Group

Revealing conceptual understanding of international business

Sue Ashley[a], Harmen Schaap[b] and Elly de Bruijn[c]

[a]Faculty of Economics and Management, HU University of Applied Sciences, Utrecht, The Netherlands; [b]Radboud Graduate School of Teaching, Radboud University, Nijmegen, The Netherlands; [c]Department of Education, Utrecht University, Utrecht, The Netherlands

ABSTRACT

This study aims to identify an adequate approach for revealing conceptual understanding in higher professional education. Revealing students' conceptual understanding is an important step towards developing effective curricula, assessment and aligned teaching strategies to enhance conceptual understanding in higher education. Essays and concept maps were used to determine how students' conceptual understanding of international business can be revealed adequately. To this end, 132 international business students in higher professional education were randomly assigned to four conditions to write essays and to construct concept maps about an international business research topic. The conditions were: essay alone, essay after concept map, concept map alone, and concept map after essay. An assessment rubric was used to assess the breadth and depth of students' conceptual understanding. Results show essays are the most adequate approach for revealing conceptual understanding of international business. In particular, concept maps revealed fewer facts and less reasoning than essays. Essays written after concept maps were less effective than essays, possibly since students perceived these essays as redundant. Further research is suggested on how educators can foster conceptual understanding.

Introduction

Preparing international business students for the wide range of roles and contexts of the international business professions is challenging for educators. Each role and context presents unique and complex realities. A typical group of students in international business education will contain a variety of aspiring professionals who will work in a variety of contexts: perhaps an investment adviser for a financial services company in Paris, a logistics manager for an agricultural supply chain in Minneapolis, an accountant for a children's charity in Cape Town, a marketing specialist for an international sports shoe brand based in Amsterdam.

Educators need to provide international business students with a worldview, international business knowledge and a global attitude (Kedia and Englis 2011). At the same time, they must prepare students for the rich-textured nature of the international business domain, the type of domain scholars call 'ill structured', because each situation evokes complicated and irregular patterns of interconnecting concepts where goals overlap and problems are unclear (Spiro et al. 1992; Neubert et al. 2015).

To function in an ill-structured domain, professionals need conceptual understanding, meaning a clear and complete overview of relevant facts, theories and professional practices connected to a

---

problem (Entwistle 2000; Harteis and Billett 2013). Because conceptual understanding involves the interrelating and structuring of complete and correct knowledge, it enables professionals to know what knowledge to apply and when to apply it (Nickerson 1985; Leppink et al. 2012). Conceptual understanding is important for professionals so that they know what steps to take, even when confronted with situations they have never encountered before (Newton 2012). It enables them to solve problems, not just by connecting individual concepts, but by putting concepts together 'to form a novel, coherent whole' (Krathwohl 2002, 215). This novel, coherent whole is more than just the sum of its parts, because it does not just mean knowledge of concepts and their connections. It also means knowing how each part relates to the whole, so that knowledge can be applied in new situations (Van Oers 1998).

So, revealing students' conceptual understanding would help educators in higher education assess its level and nature (Edens and Shields 2015). In business schools, it would enable educators to gauge the extent of students' professional development by assuring whether learning goals are met (Von der Heidt 2015). However, determining the kind of conceptual understanding needed in professional life, and revealing the extent to which their students possess it, is difficult for educators (Baartman et al. 2007). Educators struggle to develop assessment for and grade conceptual understanding, not least because it is so difficult to grasp (Nickerson 1985). Since educators need an adequate approach to reveal conceptual understanding of international business, the aim of this study is to answer the question: 'How can conceptual understanding of international business be revealed?'

Revealing conceptual understanding of international business

Conceptual understanding of international business

A first step towards revealing conceptual understanding is operationalising the concept. In a previous study, we found that conceptual understanding of international business includes six components: (1) global context characteristics, (2) local context characteristics, (3) business practices, (4) instances of business practices, (5) business concepts and (6) business mechanisms (Ashley, Schaap, and De Bruijn, forthcoming). For a particular international business situation, these six components represent a synthesis of general and specific knowledge, and concrete knowledge (context, practices and instances) and abstract knowledge (concepts and mechanisms). Besides describing these six components, deep conceptual understanding also means providing reasoning (Nickerson 1985; White 2007). In the previous study, we found that conceptual understanding of international business ultimately involves out-of-the-box thinking, which means considering alternative points of view, making novel links to other disciplines and weighing up different possibilities.

Task to reveal conceptual understanding

To reveal conceptual understanding of international business, a complex task is needed, because a complex task reflects the nature of problems typical of the ill-structured domain that is international business (Datar, Garvin, and Cullen 2011). A complex task activates a deep and active approach towards tackling a problem (Entwistle 2000). A complex task is open and unstructured, requiring the application and construction of knowledge (Alonso-Tapia 2002). The type of task needed to reveal knowledge construction, and thus conceptual understanding, requires that students use their own language rather than repeating knowledge verbatim from lectures or literature. Students can replicate knowledge without understanding it, but when they are compelled to express knowledge in their own terms, their conceptions are more likely to become apparent (White 2007). To fully engage, students should perceive the task as authentic, meaningful and relevant (Gulikers et al. 2008; Brown, Afflerbach, and Croninger 2014).

Communication approach for revealing conceptual understanding

Complex tasks require detailed communication for which relevant prior knowledge is retrieved, and arguments and ideas are explicated (Allen and Tanner 2006; Kellogg and Whiteford 2009). The communication approach for revealing conceptual understanding therefore needs to enable construction of meaning (Entwistle 2000). Meaning construction involves making connections between ideas and providing evidence for claims (Entwistle and Nisbet 2013). A communication approach that reveals connections and argumentation will reveal conceptual understanding, thereby differentiating among deep, moderate and shallow levels. Such a communication approach will enable the expression of complex information. Assessment options with the potential to reveal conceptual understanding include essays (Rijlaarsdam and Braaksma 2015), concept maps (Zanting, Verloop, and Vermunt 2003), case studies (White 2007) and portfolios (Klenowski, Askew, and Carnell 2006).

However, each communication approach has different qualities for consideration. For example, essays stimulate explication of conceptual understanding because they involve writing. This is because writing is a process that requires students to negotiate meaning (Flower and Hayes 1981). Concept maps reveal conceptual understanding through visualisation of integrated knowledge (Huijts, de Bruijn, and Schaap 2011). This is because concept maps reveal key concepts and connections involving the application of knowledge in a complex situation (Jonassen, Beissner, and Yacci 1993). Case studies of the type used for instruction in business schools require decision-making in response to multifaceted dilemmas faced by international organisations. Portfolios can provide a rich range of work samples as evidence of understanding.

While case studies are complex and authentic, and require deep conceptual understanding, their complexity makes assessment challenging (Rochford and Borchert 2011). Not only do they require the development of a complex case, they also require the development of one or more communication approaches to reveal conceptual understanding. Likewise, portfolios require assessors to perform considerable analysis, which also makes assessment difficult (Van der Schaaf and Stokking 2008). Efficient assessment is desirable because it is labour-saving for educators, manageable for students and cost-effective for institutions (Brown 2004). Compared to case studies and portfolios, essays and concept maps have the advantage of demanding less time and effort from educators and students, making them potentially valuable communication approaches for revealing conceptual understanding.

A combination of essay and concept map could be an even more effective approach for revealing conceptual understanding than either one or the other, because essays and concept maps reveal different types of knowledge. Essays highlight reasoning (Flower and Hayes 1981); concept maps highlight concepts and structure (Huijts, de Bruijn, and Schaap 2011). It could be expected then that a concept map constructed after writing an essay would reveal more conceptual understanding than a concept map alone, and that an essay written after constructing a concept map would reveal more conceptual understanding than an essay alone. The reasoning developed in the writing of an essay could potentially effect a more complex concept map with a richer range of casual connections, while the concepts and connections revealed when constructing a concept map could potentially effect a more structured essay with a richer range of concepts. Since reasoning is such an important part of conceptual understanding (Nickerson 1985; White 2007), essays written with the heuristic benefit of first constructing a concept map could feasibly be the best approach for revealing conceptual understanding. It was expected, therefore, that essays written by students who had first constructed concept maps would reveal conceptual understanding better than concept maps produced after essays.

The aim of this article is to find an adequate approach for revealing conceptual understanding of international business. In four conditions (i.e. essay alone, essay after concept map, concept map alone, and concept map after essay), bachelor-level international business students produced documents which reflected their conceptual understanding of international business. The documents were analysed with an operationalisation of conceptual understanding based on the outcome of a previous study (Ashley, Schaap, and De Bruijn, forthcoming).

Method

This study uses quantitative data to determine which of four conditions most adequately reveals conceptual understanding of international business. To provide material for analysis, international business students at a Dutch university of applied sciences wrote essays and constructed concept maps about their research.

Context

Data were collected during a course given by the first author in the first semester of the final year of a 4-year Bachelor of Business Administration degree programme. Compared to other courses, students find the graduation research component of the curriculum challenging (Reynolds and Thompson Jr. 2011). Their research experience tends to be structured projects carried out with fellow students in an educational setting, which are heavily supervised by lecturers. To graduate, they must formulate their own applied research question, conduct literature research, write a research plan, collect and analyse data, and write and defend a graduation paper. All of this must be done in one semester while the student is interning at an international company performing a variety of work activities, often in a foreign country and sometimes in their third language. Students are assigned a supervising lecturer and a company supervisor, but they find this task daunting. Therefore, the course during which the data were collected is important for preparing students.

The course comprises 14 weekly sessions of 90 min during which students develop and apply domain knowledge by conducting a literature review and making a research proposal. Students prepare weekly assignments designed to help them write a 1000-word mid-semester literature review and a 1000-word end-of-semester research proposal on their individual research topic. Each week in class, students exchange feedback and, with students' permission, the lecturer (first author) discusses individual assignments with the class. Assessment of the course is based on the literature review (50%) and research proposal (50%).

The students following the graduation research course have generally interned at an international company for half a semester in their second year of study. Nearly all have also studied abroad for one or two semesters in the third year at a partner university, including in Austria, Belgium, Canada, China, Denmark, Finland, France, Germany, Ireland, Poland, Russia, South Korea, Spain, Taiwan, Thailand and Turkey.

Participants

The study involved 132 students enrolled in the English-language programme International Business and Management Studies. Eighty (61%) were male. The mean age was 23.1 years (SD = 2.1). Most were Dutch (80%), in the fourth year (81%), had completed the first year certificate (98%), had completed the first 10-week internship (98%) and had submitted (but not yet received a grade for or feedback on) the literature review on their research topic (84%) (Table 1).

Table 1. Participant metadata at time of task (*N* = 132).

Nationality	The students were from 14 different countries, namely Bulgaria (10), Burundi, China, Croatia, France (2), Germany (3), Ghana, Iraq (2), Macedonia, The Netherlands (106), Russia, Somalia, Thailand and Vietnam
Year of study	Most students were in their 4th year (107). Students with study delay were in their 5th year (18), 6th year (2), 7th year (2) or 8th year (3)
First year certificate	Mean delay = .7 years (SD = .8)
	[no delay(36), semester delay (36), year delay (36), 2-year delay (14), over 2-year delay (8), exempted (2)]
First internship	Mean grade = 7.8/10.0 (SD = .8)
	[passed (128), not yet done (3), exempted(1)]
Literature review	Mean grade = 6.2/10.0 (SD = 1.7)
	[passed (84), failed (27), not yet submitted (21)]

Table 2. Conditions and sample sizes.

Condition		n	Essay	Concept map
1	Essay alone	36	x	
2	Essay after concept map	35	x	x
3	Concept map alone	30		x
4	Concept map after essay	31	x	x

At the time of the research activity, students had earned an average of 174 credits (SD = 17) towards the 240 (73%) needed to graduate.

Experimental conditions

To investigate which approach is the most adequate for revealing conceptual understanding of international business, the students were randomly assigned to one of four conditions. Depending on the condition, students: (1) wrote an essay, (2) first constructed a concept map and then wrote an essay, (3) constructed a concept map, or (4) first wrote an essay and then constructed a concept map (Table 2).

Chi-square tests showed an even spread of male students and Dutch students per condition. Analysis of variance (ANOVA) showed no significant effect of condition on age, study delay, grades or credits.

Task

The task given to reveal conceptual understanding was related to assessment in the graduation research course. This made the task authentic, meaningful and relevant (Brown, Afflerbach, and Croninger 2014). Students were asked to 'explain as clearly and in as much detail as you can the business area you are interested in researching for your graduation project at an international company'. The task was authentic because it involved the complex domain of international business (Datar, Garvin, and Cullen 2011). The task was designed to be meaningful for students, by offering them individual feedback to help with future graduation research. The task was relevant for students because it was about their own research. Since the task was authentic, meaningful and relevant, we expected that the task would be an adequate trigger for students to reveal conceptual understanding of international business.

Essays and concept maps

Students were experienced in using MS Word for essay writing and MS Visio for concept mapping. When producing the essays and concept maps, students were permitted to use Word spelling and grammar, thesaurus and translation tools. They could not use the Internet, books or their own notes.

For the essays, students were advised to use an introduction, body and conclusion. For the concept maps, students were advised to use shapes, colour and arrows, and to explain concepts and connections. The concept map groups received concept maps on 'obesity' as an example, and also practised constructing a concept map on 'Christmas' with the first author.

Assessment rubric

A rubric was used to assess students' essays and concept maps because rubrics are useful tools to explicate and assess the criteria and standards of complex learning outcomes like conceptual understanding (Allen and Tanner 2006; Reddy and Andrade 2010). The rubric was based on the previous study (Ashley, Schaap, and De Bruijn, forthcoming), and scores six components and five degrees of conceptual understanding of international business, culminating in a level of conceptual understanding from 6 for *negligible* to 30 for *extraordinary* (Table 3).

Table 3. Rubric for revealing conceptual understanding of international business.

Components		Five-point scale				
		Negligible	Weak	Moderate	Strong	Extraordinary
		Trivial or false information	Blurred or unnamed features	Essential features	Objective reasoning based on facts	Out-of-the-box thinking
		1 Point	2 Points	3 Points	4 Points	5 Points
Background	1 Global context characteristics [general]	Names an international entity	Implies international conditions	Describes international conditions	Explains significance of international conditions for topic	Explores alternative ways of regarding the global situation
	2 Local context characteristics [specific]	Names the region or country	Implies local circumstances	Describes local circumstances	Explains significance of local circumstances for topic	Explores alternative ways of regarding the local situation
Concrete	3 Business practices [general]	Uses layman's terms for business activities	Lists business activities	Describes what businesses do	Gives reasons for what businesses do	Explores which business practices suit which situations
	4 Practice instances [specific]	Names the company	Lists company facts	Describes what particular companies do	Gives reasons for what particular companies do	Explores alternative viewpoints on how particular companies should act
Abstract	5 Business concepts [general]	Uses layman's terms for business concepts	Lists business concepts	Defines business concepts	Explains significance of business concepts for topic	Provides novel links to other disciplines
	6 Business mechanisms [specific]	Uses layman's terms for business mechanisms	Lists business mechanisms	Describes business mechanism components	Explains how business mechanisms work	Explores how business mechanisms work in different situations

Content validity of the rubric was established during the previous study through two independent panels of experts from academia, education and professional practice, who explicated knowledge and experience of the international business domain. Concurrent validity of the rubric was checked by determining the relationship between the students' conceptual understanding and academic performance. A positive correlation was expected between the two variables because a strong academic performance requires deep conceptual understanding (Entwistle 2000). Conceptual understanding showed no relationship with study delay (p = .161), internship grades (p = .417) or total credit points students had achieved towards their bachelor's degree (p = .563). However, there was a small correlation between conceptual understanding and literature review grades, which was statistically significant, $r(130)$ = .23, p = .009.

To check inter-rater reliability of the rubric, the first author and a second researcher both used it to assess 12 essays (17%) and 12 concept maps (20%). Since it is not possible to anticipate all student reactions to tasks, collaboration between assessors is needed (Allen and Tanner 2006; Kellogg and Whiteford 2009). To sharpen scoring, the researchers met three times to discuss essay scores (after scoring the first two essays, next five essays and final five essays), and twice to discuss concept map scores (after scoring the first seven concept maps and final five concept maps). The researchers discussed all component levels they had scored differently. They reached consensus on the difference between a trivial (*negligible*) and an implied (*weak*) fact, the nature of an essential feature (*moderate*), how much explanation is needed for adequate argumentation (*strong*) and what signifies out-of-the-box thinking (*extraordinary*). Discussion on the components included what counts as *global context* and *local context*, what constitutes a *business practice* or *business concept*, how detailed *specific instances* need to be, and how clearly independent and dependent variables of *business mechanisms* need to be explained.

To show the magnitude of agreement between the assessors' grades, Cohen's weighted kappa with quadratic weighting was used, because this statistic gives more weight to grades close together than grades far apart (Sadler and Good 2006). Tests of inter-rater reliability showed good agreement between the two raters' judgements for the six components in the 12 essays (72 values), κ_w = .67 (p < .001), 95% CI (.55, .79), for the six components in the 12 concept maps (72 values), κ_w = .70 (p < .001), 95% CI (.56, .84) and for the six components in the 12 essays and 12 concept maps taken together (144 values), κ_w = .73 (p < .001), 95% CI (.65, .81).

Procedure

Material for revealing conceptual understanding was collected from the students after six weeks of desk research to define their individual research topics. Data collection took place during class.

Under supervision of the first author, students were given one hour on school computers to write an essay or to construct a concept map about their research topic. Computers were used because they make it easier for students to produce and rearrange text and concept maps (Nobles and Paganucci 2015; Van den Bogaart et al. 2016). In the two groups that produced an essay and concept map, students were given one hour for the essay *and* one hour for the concept map, so two hours in total, and these activities took place at the same session.

The first author spent about 15 min going through written instructions with the students on writing essays or constructing concept maps. Before students constructed the concept maps, the first author spent an additional 15 min eliciting a practice concept map from the group on the whiteboard about Christmas.

In each condition, students started essays and concept maps at the same time. If they ran out of ideas before the 1-h time limit, they could finish early; in the combination conditions, they were permitted a 10-min break until the second activity was scheduled to start. Students saved the resulting essays and concept maps with provided code names before emailing them to the first author. Students in the combination conditions answered an open question after the second activity about how suitable they found the essay or concept map for explicating their conceptual understanding.

Table 4. Time spent per condition (minutes).

Condition		Essays		Concept maps	
		Mean	SD	Mean	SD
1	Essay alone	52.6	8.4	–	–
2	Essay after concept map	51.4	7.9	54.6	5.5
3	Concept map alone	–	–	52.7	5.3
4	Concept map after essay	54.2	5.2	52.7	6.9

Note: Underlined figures indicate statistically significant results.

Since students in each condition started at the same time and emailed their essays and concept maps as soon as they finished them, the time students spent on each activity could be calculated. One-way ANOVA showed no significant difference among conditions for time taken on essays ($p = .215$) or concept maps ($p = .321$). For Condition 2, a paired samples t-test showed that students spent significantly less time on the essays than the concept maps ($p = .021$). The effect size was small to medium ($d = .357, p = .035$). Condition 4 students spent less time on the concept maps than the essays, but not significantly so ($p = .216$) (Table 4).

The first author scored the essays and concept maps with the aid of the rubric. These scores were then systematically compared among conditions to decide the best condition for revealing conceptual understanding of international business.

Data analysis

First, a multivariate analysis of variance (MANOVA) using Wilks' statistic was used to determine whether condition had an effect on the six components of conceptual understanding taken as a group. Next, one-way ANOVA were used to investigate whether differences in scores for each component of conceptual understanding were significantly explained by the four conditions. ANOVA assumes homogeneity of variance within groups so Levene's test of equality was used to check whether scores within each condition varied significantly: a statistically significant result for Levene's test means the null hypothesis that assumes no difference among groups cannot be rejected (Field 2009). Where homogeneity of variance could not be assumed, Welch's F-test was used to investigate differences among conditions because it takes differences within groups into account (Gastwirth, Gel, and Miao 2009).

The condition that most adequately reveals conceptual understanding is the one that best differentiates among negligible, weak, moderate, strong and extraordinary levels. For each component of conceptual understanding, the best condition should: (1) produce a wide spread of scores, (2) clearly differentiate between low scores, and (3) clearly differentiate between high scores. To determine which condition produced the widest spread of scores, mean scores and standard deviations (SDs) were calculated for each component of conceptual understanding. ANOVA post hoc tests were conducted to determine whether the condition that generated the highest mean scores and SDs for each component of conceptual understanding varied significantly from each of the other three conditions. While the Bonferroni correction reduces statistical error resulting from multiple tests, Games-Howell *post hoc* procedures were used to account for unequal group variances in the cases where homogeneity of variance was violated (Field 2009).

To discover which condition most clearly differentiated between low scores, percentages of negligible and weak scores were calculated per condition for each component of conceptual understanding. Since low scores reveal little conceptual understanding, the best condition would be the one which yielded the lowest percentages of low scores.

To establish which condition most clearly differentiated between high scores, percentages of strong and extraordinary scores were calculated per condition for each component of conceptual understanding. Since high scores indicate deep conceptual understanding, the best condition is the one which yielded the highest percentages of high scores.

Table 5. One-way ANOVA of condition effect on conceptual understanding[a].

Components	df_M	df_R	Welch's F	p	η^2
Global context	3	61.70	9.01	<.001	.12
Local context	3	64.22	13.05	<.001	.22
Business practices	3	69.79	7.50	<.001	.14
Practice instances	3	60.94	16.52	<.001	.29
Business concepts	3	70.79	4.31	.008	.08
Components	*df_M*	*df_R*	*F*	*p*	*η^2*
Business mechanisms	3	128	3.55	.016	.08

[a]Levene's test produced significant results for all components except business mechanisms. Where homogeneity of variance among conditions could not be assumed, Welch's F-test was used.

To capture the Condition 2 and Condition 4 students' perceptions of essay and concept map suitability for explicating conceptual understanding, their comments were categorised. A representative sample of comments from each condition was chosen to illustrate the main themes raised.

Results

For the six components of conceptual understanding taken as a group, multivariate effect of condition on scores was significant using Wilks' statistic, $\Lambda = .51$, $F(18, 348.38) = 5.15$, $p < .001$. One-way ANOVA indicated significant differences of the six components of conceptual understanding among the four conditions at the $p < .05$ level (Table 5).

Spread of scores among conditions

Table 6 shows the mean scores and SDs per component of conceptual understanding for the four conditions. Condition 1 (essay alone) produced the highest mean scores for five of the six components of conceptual understanding and the highest SDs for four of the six components. For business mechanisms, the mean score and SD were higher for Condition 2 (essay after concept map) than for Condition 1, but not significantly so ($p = 1.000$). For five of the six components of conceptual understanding, *post hoc* comparisons show that Condition 1 mean scores were significantly different from at least one other condition at the $p < .05$ level.

Table 6. Mean scores and standard deviations of conditions*.

	Condition 1		Condition 2		Condition 3		Condition 4	
	M	SD	*M*	SD	*M*	SD	*M*	SD
Global context	1.67[a]	1.04	1.63	.91	1.03[a]	.18	1.19	.48
Local context	2.36[b]	1.40	1.83	1.07	1.10[b]	.31	1.23[b]	.67
Business practices	2.56[c]	1.11	2.49	.95	1.77[c]	.90	1.81[c]	.60
Practice instances	2.39[d]	1.27	1.60[d]	.98	1.13[d]	.43	1.03[d]	.18
Business concepts	2.58[e]	.73	2.51	.95	2.20	.61	2.06[e]	.57
Business mechanisms	2.03	.81	2.09[f]	.89	1.73	.83	1.52[f]	.68

[a]Global context mean scores vary significantly between Conditions 1 and 3 ($p = .005$).
[b]Local context mean scores vary significantly between Conditions 1 and 3 ($p < .001$), and between Conditions 1 and 4 ($p < .001$).
[c]Business practices mean scores vary significantly between Conditions 1 and 3 ($p = .011$) and between Conditions 1 and 4 ($p = .005$).
[d]Practice instances mean scores vary significantly between Conditions 1 and 2 ($p = .023$), Conditions 1 and 3 ($p < .001$), and Conditions 1 and 4 ($p < .001$).
[e]Business concepts mean scores vary significantly between Conditions 1 and 4 ($p = .010$).
[f]Business mechanisms mean scores vary significantly between Conditions 2 and 4 ($p = .029$).
*Levene's test produced significant results for all components except business mechanisms. For business mechanisms, the Bonferroni correction was used because it reduces statistical error resulting from multiple tests. For the other components, Games-Howell *post hoc* procedures were necessary because homogeneity of variance among conditions could not be assumed. Still, it is worth noting that Bonferroni results were also statistically significant for these tests.

For practice instances, Condition 1 scored significantly higher than the other four conditions. The mean score was 2.39 out of 5. To illustrate this level, an excerpt from an essay that scored 2 (weak) for practice instances only mentioned that a particular electronics company was marketing a Smartphone, while the description of a particular photography company in another essay that scored 3 (moderate) included their location ('20 V&D [department stores] in the Netherlands'), what they do ('taking and selling pictures') and problems they face ('[delivery] trucks are not completely full'). Condition 1 contrasts sharply with Condition 4 (concept map after essay) where none of the concept maps revealed any understanding regarding business instances.

Differentiation of low scores among conditions

The lowest scores awarded for components of conceptual understanding were 1 (negligible) and 2 (weak). A negligible score reveals little to no conceptual understanding. For instance, one concept map scored 1 for local context because the only reference to local context was a shape labelled 'domestic outsourcing'. This concept map gave no clue of the location so this information was deemed trivial. An example from a concept map that scored 2 for local context linked two shapes with an arrow: 'Chinese government regulation and law regarding to waste paper import → Domestic consignee regulation'. This concept map refers to a general location and suggests some knowledge of the local context.

Table 7 shows the percentages of low scores per condition. Overall, Condition 1 (essay alone) produced the lowest percentage of negligible and weak scores (64% in total), while Condition 4 (concept map after essay) produced the highest (92% in total). For all components of conceptual understanding, Condition 3 (concept map alone) and Condition 4 reveal very little conceptual understanding as evidenced by the high frequencies of negligible scores.

Differentiation of high scores among conditions

The highest scores awarded for components of conceptual understanding were 4 (strong) and 5 (extraordinary). Few concept maps produced high scores. However, an example of a concept map that scored a 4 for business practices included activities like 'social media marketing' and reasoning like 'low entry barrier', 'increases customer turnover' and 'increase of ROE [return on investment]'. Only essays scored 5. As an example, an essay that scored 5 for business practices explored activities of oil companies, considering factors as diverse as 'effects on ecosystems', 'tax revenues, jobs created and investments in infrastructure', 'technological advancements' and 'public relations'.

Table 8 shows the percentages of high scores per condition, namely scores of strong (4) and extraordinary (5). Overall, Condition 1 (essay alone) produced the highest percentages of strong and extraordinary scores. Condition 2 (essay after concept map) scored a higher percentage of extraordinary scores for global context and a higher percentage of strong scores for business concepts. However, Condition 1 outscored the other conditions on all other strong and extraordinary scores.

Table 7. Percentages of negligible (1) and weak (2) scores per condition.

Scores	Condition 1		Condition 2		Condition 3		Condition 4	
	1	2	1	2	1	2	1	2
Global context	64	17	57	29	97	3	84	13
Local context	31	42	49	34	90	10	87	7
Business practices	19	31	14	40	47	37	29	61
Practice instances	36	14	66	17	90	7	97	3
Business concepts	–	56	11	46	7	70	13	68
Business mechanisms	28	44	34	23	50	27	58	32
Totals	30	34	39	31	63	26	61	31

Table 8. Percentages of strong (4) and extraordinary (5) scores per condition.

	Condition 1		Condition 2		Condition 3		Condition 4	
Scores	4	5	4	5	4	5	4	5
Global context	11	–	–	3	–	–	–	–
Local context	11	14	9	3	–	–	3	–
Business practices	19	3	17	–	7	–	–	–
Practice instances	14	6	9	–	–	–	–	–
Business concepts	14	–	20	–	3	–	–	–
Business mechanisms	3	–	–	–	–	–	–	–
Totals	12	4	9	1	2	–	1	–

Table 9. Student perceptions of essays and concept maps.

	Condition 2 perceptions of essay	Condition 4 perceptions of concept map
1	Gives opportunity to emphasise the main points (Condition 2 Student15)	Able to identify core topics (Condition 4 Student 27)
2	A useful way of combining my various thoughts (C2S20)	Helped me see better the connection between the factors (C4S28)
3	Helps to brainstorm and come up with additional ideas (C2S4)	Came up with more topics and relations (C4S9)
4	Gave me a better insight of the subjects that I have to research (C2S28)	Raises new questions (C4S16)
5	Was continuing the concept map with more words (C2S17)	Just made an overview of what I already knew (C4S12)
6	For me it's not necessary to 'extra' write down (*sic*) in the form of an essay (C2S19)	Downside: already partially done this in my own mind (C4S13)
7	The concept map gives a good general overview, the essay gives a more detailed overview (C2S8)	Confusing in the beginning (C4S25)
8	With the concept map it is easier to write an essay and to explore on the research topic (C2S27)	Made me confused because all is related to each other but I couldn't find a proper way to display it (C4S31)

Condition 2 and 4 student perceptions

Regarding perceived suitability of the second activity for explicating their conceptual understanding, Condition 2 students (essay after concept map) and Condition 4 students (concept map after essay) indicated positive and negative points (Table 9). Most Condition 2 students (*n* = 35) and Condition 4 students (*n* = 31) indicated that essays or concept maps helped them identify key points, make connections, brainstorm and consider further possibilities (rows 1–4). On the other hand, comments from both conditions suggested students found the second task onerous (rows 5–6). Comments also suggested that students perceived value in constructing a concept map before writing an essay, and that students perceived concept map construction as difficult (rows 7–8).

Discussion

This study explores four approaches for revealing conceptual understanding of international business: essays, essays after concept maps, concept maps and concept maps after essays. Three criteria were used to determine which approach best reveals conceptual understanding: (1) spread of scores, (2) differentiation between low scores and (3) differentiation between high scores. From analysis of the essays and concept maps, results for all three criteria suggest that the essays are the most adequate approach for revealing conceptual understanding of international business. Essays show the widest spread of scores, and differentiate best between high scores and between low scores. That even the essays did not get a complete range of scores for all components of conceptual understanding could be because the participants of this study did not have enough complex knowledge of international business. Further research involving graduates, post graduates and professionals could be done to test

whether the optimum spectrum of component scores can be achieved from participants with more complex knowledge of international business.

We had expected that the essay-after-concept-map and concept-map-after-essay conditions would reveal conceptual understanding more adequately than just essays. We expected that students who had first constructed a concept map or written an essay would reveal more conceptual understanding than students who had not. Essays were expected to reveal understanding because writing an essay involves constructing knowledge by generating relevant, salient ideas (Tynjälä, Mason, and Lonka 2001). Concept maps were expected to reveal conceptual understand because constructing a concept map involves discovering and evaluating relevant concepts, and creating and making salient connections (Novak 2010a).

A possible reason for the combination conditions failing to reveal conceptual understanding as well as the essay-alone condition is that students did not see the point of explaining their research twice, and so did not put the same level of energy into the second activity. Student comments in this study support this conclusion that they were not as motivated to explain their research during the second activity. This explanation is also supported by De Simone, Schmid, and McEwen (2001), whose study required university students to generate both prose and concept maps during a course designed to improve learning outcomes. They report that students did not like having to both write prose and construct concept maps because of the perceived redundancy.

Another explanation could be that the essays and concept maps reveal different types of thinking. The reasoning focus of essays (Flower and Hayes 1981) and the structural focus of concept maps (Huijts, de Bruijn, and Schaap 2011) are possibly not aligned. For revealing conceptual understanding, reasoning appears to be more important, and that is possibly why the essays revealed more conceptual understanding than the essays written after concept maps. The concept maps could have negatively affected the reasoning developed in the essays.

The concept maps revealed conceptual understanding less adequately than the essays, which was unexpected. This is because concept maps, like essays, involve the construction and explication of meaning (Novak 2010a). In particular, the concept maps revealed hardly any conceptual understanding of global knowledge, local knowledge or specific concrete knowledge, three components of conceptual understanding identified in our previous study (Ashley, Schaap, and De Bruijn, forthcoming). Hardly any concept maps contained more information about context or specific circumstances than the name of an international entity, region or company. Overall, concept maps revealed fewer facts and less reasoning than essays.

However, the concept maps might have revealed more conceptual understanding if the students had received more concept-map training on how to express the complex interconnections of concepts typical of an ill-structured domain. Student comments in this study support this conclusion. Two-day intensive training sessions of the type that Novak (2010a) suggests are needed to elicit knowledge from a group of business experts could be one training possibility for further investigation. Another possibility could be to prompt students with partially completed concept maps. Novak (2010b) suggests providing students with 'expert skeleton concept maps' as a prompt to aid learning, but such concept maps might also prompt students to reveal more conceptual understanding.

The core outcome of this study, that essays are the most adequate approach for revealing conceptual understanding, raises a number of issues.

Suitability of essays for assessing conceptual understanding

This study found that essays are the most adequate approach for revealing conceptual understanding of international business. This is not an unwelcome result given that essays are a practicable option for educators. However, it could be argued that, since conceptual understanding is complex, a more labour intensive assessment approach might be needed to fully reveal conceptual understanding. Labour intensive assessment approaches can have negative outcomes, however, since they can demotivate students by demanding more effort (Bangert-Drowns, Hurley, and Wilkinson 2004). Of course, essays

also demand effort of students. One way to help students explicate more conceptual understanding in essays might be to use concept maps as a short pre-writing activity of 5–10 min rather than the 1-h approach used in this study. Concept maps constructed as a pre-writing activity can help students explicate more conceptual understanding in essays, because they help students brainstorm and organise content before they start writing (Flanagan and Bouck 2015). Students perceived concept maps as potentially useful pre-writing activities because, like the essays, they helped them reveal key themes, connect ideas, produce new insights and raise questions for further study. Further research could investigate the potential of using concept maps as a short pre-writing activity to prompt students to reveal more conceptual understanding of international business in essays.

Suitability of task for revealing conceptual understanding

Regarding the student task for this study, one question that deserves attention is whether asking students to explain their individual research topics can produce comparable results. In general, comparability requires consistent scoring and conditions (Baartman et al. 2007). For instance, concerning conditions in our research, all students had the same task of explaining their graduation research. The task had the potential to fully engage all students because it was authentic, meaningful and relevant (Gulikers et al. 2008; Brown, Afflerbach, and Croninger 2014). The task was similarly complex for all students because it required application and construction of knowledge (Alonso-Tapia 2002). Students also had the same time to work on their research and were following the same course. It was assumed for this study that, although the content that individual students produced was different, consistency in conditions allowed comparability. However, it could be a goal of further research to investigate whether individual research topics do indeed provide as much comparability as one topic common to all students.

Concurrent validity of the rubric

Concurrent validity of the rubric that was developed to reveal conceptual understanding of international business was indicated by the small correlation between conceptual understanding and literature review grades. A relationship between the two variables was not surprising, because the research topics students explored in their essays and concept maps were the same research topics they had written about in their literature reviews. The small size of this correlation was also not surprising, because the two variables do not fully converge: students' conceptual understanding does not fully relate to the grades they receive for literature reviews, since it comprises more components than the theoretical, academic understanding represented by the literature review grade. Conceptual understanding was not indicated by other assessment indicators like study delay, internship grades and total credit points students had achieved towards their bachelor's degree. Further research could investigate what assessment indicators do signal conceptual understanding.

Further research

This study shows the adequacy of essays as an approach for revealing conceptual understanding of international business in final-year bachelor students, an approach involving substantial writing. There is growing consensus in higher education that assessments require too little substantial writing (Arum and Roksa 2011). Further research could therefore investigate the suitability of essays for revealing conceptual understanding of other domains and at other levels of education.

This study discovered that essays have the potential for assessing conceptual understanding. However, essays might also have the potential to contribute to the development of conceptual understanding (Galbraith 2015; Klein and Boscolo 2016). Further research could investigate the suitability of essay writing for fostering conceptual understanding, not only of international business but also of other knowledge domains.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Allen, D., and K. Tanner. 2006. "Rubrics: Tools for Making Learning Goals and Evaluation Criteria Explicit for Both Teachers and Learners." *CBE Life Sciences Education* 5: 197–203. doi:http://dx.doi.org/10.1187/cbe.06-06-0168.

Alonso-Tapia, J. 2002. "Knowledge Assessment and Conceptual Understanding." In *Reconsidering Conceptual Change: Issues in Theory and Practice*, edited by M. Limón and L. Mason, 389–413. Dordrecht: Kluwer Academic.

Arum, R., and J. Roksa. 2011. "Limited Learning on College Campuses." *Society* 48: 203–207. doi:http://dx.doi.org/10.1007/s12115-011-9417-8.

Ashley, S., H. Schaap, and E. De Bruijn. Forthcoming. "Defining Conceptual Understanding for Teaching in International Business." *Journal of Teaching in International Business*. doi:http://dx.doi.org/10.1080/08975930.2015.1134378.

Baartman, L. K. J., T. J. Bastiaens, P. A. Kirschner, and C. P. M. Van der Vleuten. 2007. "Evaluating Assessment Quality in Competence-based Education: A Qualitative Comparison of Two Frameworks." *Educational Research Review* 2: 114–129. doi:http://dx.doi.org/10.1016/j.edurev.2007.06.001.

Bangert-Drowns, R. L., M. M. Hurley, and B. Wilkinson. 2004. "The Effects of School-Based Writing-to-Learn Interventions on Academic Achievement: A Meta-analysis." *Review of Educational Research* 74: 29–58. doi:http://dx.doi.org/10.3102/00346543074001029.

Brown, S. 2004. "Assessment for Learning." *Learning and Teaching in Higher Education* 1: 81–89. http://www2.glos.ac.uk/offload/tli/lets/lathe/issue1/issue1.pdf.

Brown, N. J. S., P. P. Afflerbach, and R. G. Croninger. 2014. "Assessment of Critical-Analytic Thinking." *Educational Psychology Review* 26: 543–560. doi:http://dx.doi.org/10.1007/s10648-014-9280-4.

Datar, S. M., D. A. Garvin, and P. G. Cullen. 2011. "Rethinking the MBA: Business Education at a Crossroads." *Journal of Management Development* 30: 451–462. doi:http://dx.doi.org/10.1108/02621711111132966.

De Simone, C., R. F. Schmid, and L. A. McEwen. 2001. "Supporting the Learning Process with Collaborative Concept Mapping Using Computer-based Communication Tools and Processes." *Educational Research and Evaluation* 7: 263–283. doi:http://dx.doi.org/10.1076/edre.7.2.263.3870.

Edens, K., and C. Shields. 2015. "A Vygotskian Approach to Promote and Formatively Assess Academic Concept Learning." *Assessment & Evaluation in Higher Education* 40: 928–942. doi:http://dx.doi.org/10.1080/02602938.2014.957643.

Entwistle, N. J. 2000. "Approaches to Studying and Levels of Understanding: The Influences of Teaching and Assessment." In *Higher Education: Handbook of Theory and Research*. vol. XV, edited by J. C. Smart and W. G. Tierney, 156–218. New York: Agathon Press.

Entwistle, N., and J. Nisbet. 2013. "The Nature and Experience of Academic Understanding." *The Psychology of Education Review* 37: 5–14. http://www.research.ed.ac.uk/.

Field, A. 2009. *Discovering Statistics Using SPSS*. 3rd ed. London: Sage.

Flanagan, S. M., and E. C. Bouck. 2015. "Mapping out the Details: Supporting Struggling Writers' Written Expression with Concept Mapping." *Preventing School Failure: Alternative Education for Children and Youth* 59: 244–252. doi:http://dx.doi.org/10.1080/1045988X.2014.933400.

Flower, L., and J. R. Hayes. 1981. "A Cognitive Process Theory of Writing." *College Composition and Communication* 32: 365–387. doi:http://dx.doi.org/10.2307/356600.

Galbraith, D. 2015. "Conditions for Writing to Learn." *Journal of Writing Research* 7: 215–226. doi:http://dx.doi.org/10.17239/jowr-2015.07.01.09.

Gastwirth, J. L., Y. R. Gel, and W. Miao. 2009. "The Impact of Levene's Test of Equality of Variances on Statistical Theory and Practice." *Statistical Science* 24: 343–360. doi:http://dx.doi.org/10.1214/09-sts301.

Gulikers, J. T. M., T. J. Bastiaens, P. A. Kirschner, and L. Kester. 2008. "Authenticity is in the Eye of the Beholder: Student and Teacher Perceptions of Assessment Authenticity." *Journal of Vocational Education and Training* 60: 401–412. doi:http://dx.doi.org/10.1080/13636820802591830.

Harteis, C., and S. Billett. 2013. "Intuitive Expertise: Theories and Empirical Evidence." *Educational Research Review* 9: 145–157. doi:http://dx.doi.org/10.1016/j.edurev.2013.02.001.

Huijts, P. M., Elly de Bruijn, and H. Schaap. 2011. "Revealing Personal Professional Theories: An Explorative Methodological Study." *Quality & Quantity* 45: 783–800. doi:http://dx.doi.org/10.1007/s11135-010-9322-z.

Jonassen, D. H., K. Beissner, and M. Yacci. 1993. *Structural Knowledge: Techniques for Representing, Conveying, and Acquiring Structural Knowledge*. Hillsdale, NJ: Lawrence Erlbaum.

Kedia, B. L., and P. D. Englis. 2011. "Transforming Business Education to Produce Global Managers." *Business Horizons* 54: 325–331. doi:http://dx.doi.org/10.1016/j.bushor.2011.02.006.

Kellogg, R. T., and A. P. Whiteford. 2009. "Training Advanced Writing Skills: The Case for Deliberate Practice." *Educational Psychologist* 44: 250–266. doi:http://dx.doi.org/10.1080/00461520903213600.

Klein, P. D., and P. Boscolo. 2016. "Trends in Research on Writing as a Learning Activity." *Journal of Writing Research* 7: 311–350. doi:http://dx.doi.org/10.17239/jowr-2016.07.3.1.

Klenowski, V., S. Askew, and E. Carnell. 2006. "Portfolios for Learning, Assessment and Professional Development in Higher Education." *Assessment & Evaluation in Higher Education* 31: 267–286. doi:http://dx.doi.org/10.1080/02602930500352816.

Krathwohl, D. R. 2002. "A Revision of Bloom's Taxonomy: An Overview." *Theory into Practice* 41: 212–218. doi:http://dx.doi.org/10.1207/s15430421tip4104_2.

Leppink, J., N. J. Broers, T. Imbos, C. P. M. van der Vleuten, and M. P. F. Berger. 2012. "Prior Knowledge Moderates Instructional Effects on Conceptual Understanding of Statistics." *Educational Research and Evaluation* 18: 37–51. doi:http://dx.doi.org/10.1080/13803611.2011.640873.

Neubert, J. C., J. Mainert, A. Kretzschmar, and S. Greiff. 2015. "The Assessment of 21st Century Skills in Industrial and Organizational Psychology: Complex and Collaborative Problem Solving." *Industrial and Organizational Psychology* 8: 238–268. doi:http://dx.doi.org/10.1017/iop.2015.14.

Newton, D. P. 2012. *Teaching for Understanding: What It is and How to Do It*. 2nd ed. London: Routledge.

Nickerson, R. S. 1985. "Understanding Understanding." *American Journal of Education* 93: 201–239. doi:http://dx.doi.org/10.1086/443791.

Nobles, S., and L. Paganucci. 2015. "Do Digital Writing Tools Deliver? Student Perceptions of Writing Quality Using Digital Tools and Online Writing Environments." *Computers and Composition* 38: 16–31. doi:http://dx.doi.org/10.1016/j.compcom.2015.09.001.

Novak, J. D. 2010a. *Learning, Creating, and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations*. 2nd ed. New York: Routledge.

Novak, J. D. 2010b. "Learning, Creating, and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations." *Journal of E-Learning and Knowledge Society* 6 (3): 21–30. http://www.je-lks.org/.

Reddy, Y. M., and H. Andrade. 2010. "A Review of Rubric Use in Higher Education." *Assessment & Evaluation in Higher Education* 35: 435–448. doi:http://dx.doi.org/10.1080/02602930902862859.

Reynolds, J. A., and R. J. Thompson Jr. 2011. "Want to Improve Undergraduate Thesis Writing? Engage Students and Their Faculty Readers in Scientific Peer Review." *CBE Life Sciences Education* 10: 209–215. doi:http://dx.doi.org/10.1187/cbe.10-10-0127.

Rijlaarsdam, G., and M. Braaksma. 2015. "Introduction." *Journal of Writing Research* 7: 1–4. doi:http://dx.doi.org/10.17239/jowr-2015.07.01.01.

Rochford, L., and P. S. Borchert. 2011. "Assessing Higher Level Learning: Developing Rubrics for Case Analysis." *Journal of Education for Business* 86: 258–265. doi:http://dx.doi.org/10.1080/08832323.2010.512319.

Sadler, P. M., and E. Good. 2006. "The Impact of Self- and Peer-Grading on Student Learning." *Educational Assessment* 11: 1–31. doi:http://dx.doi.org/10.1207/s15326977ea1101_1.

Spiro, R. J., P. J. Feltovich, M. J. Jacobson, and R. L. Coulson. 1992. "Cognitive Flexibility, Constructivism, and Hypertext: Random Access Instruction for Advanced Knowledge Acquisition in Ill-Structured Domains." In *Constructivism and the Technology of Instruction: A Conversation*, edited by T. M. Duffy and D. H. Jonassen, 57–75. Hillsdale, NJ: Lawrence Erlbaum Associates.

Tynjälä, P., L. Mason, and K. Lonka. 2001. "Writing as a Learning Tool: An Introduction." In *Writing as a Learning Tool: Integrating Theory and Practice*, edited by P. Tynjälä, L. Mason, and K. Lonka, 7–22. Dordrecht: Kluwer Academic.

Van den Bogaart, A. C. M., R. J. C. Bilderbeek, H. Schaap, H. G. K. Hummel, and P. A. Kirschner. 2016. "A Computer-supported Method to Reveal and Assess Personal Professional Theories in Vocational Education." *Technology, Pedagogy and Education*. Advance online publication. doi:http://dx.doi.org/10.1080/1475939X.2015.1129986.

Van der Schaaf, M. F., and K. M. Stokking. 2008. "Developing and Validating a Design for Teacher Portfolio Assessment." *Assessment & Evaluation in Higher Education* 33: 245–262. doi:http://dx.doi.org/10.1080/02602930701292522.

Van Oers, B. 1998. "From Context to Contextualizing." *Learning and Instruction* 8: 473–488. doi:http://dx.doi.org/10.1016/S0959-4752(98)00031-0.

Von der Heidt, T. 2015. "Concept Maps for Assessing Change in Learning: A Study of Undergraduate Business Students in First-year Marketing in China." *Assessment & Evaluation in Higher Education* 40: 286–308. doi:http://dx.doi.org/10.1080/02602938.2014.910637.

White, C. S. 2007. "Levels of Understanding: A Guide to the Teaching and Assessment of Knowledge." *Journal of Education for Business* 82: 159–163. doi:http://dx.doi.org/10.3200/JOEB.82.3.159-163.

Zanting, A., N. Verloop, and J. D. Vermunt. 2003. "Using Interviews and Concept Maps to Access Mentor Teachers' Practical Knowledge." *Higher Education* 46: 195–214. doi:http://dx.doi.org/10.1023/A:1024719816657.