Unpacking the revised Bloom’s taxonomy

developing case-based learning activities

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Running Heads:

1. Introduction

Incrementality has been applied to learning tasks in order to scaffold activities to ease achievement of learning outcomes (Giraud-Carrier, 2000). An incremental learning style gives students opportunity for cognitive development through revision of a single knowledge structure followed by applications and experience. The basic principle of incremental learning is that first simple concepts are expressed in instances, and then more complex concepts are introduced in terms of high-level training cases (Sammut and Banerji, 1986; Shapiro, 1987). In other words, in incremental learning, new knowledge is created based on new data, and the existing knowledge base may be modified for improved use over time (Bouchachia, 2009). Unlike teachable knowledge, which uses facts or principles that are known, incremental learning tasks require stepped solutions within instance-based framework (Aha et al., 1991; Ourston and Mooney, 1994). The incremental learning framework promotes learning at the level of metacognition as a final outcome underpinned by generalised task with respect to the cognitive aspects (Klebba and Hamilton, 2007). This rationale supports action-oriented aspects of this research.

Bloom et al. (1956) proposed a cognitive Taxonomy that is consistent with critical thinking and educational learning hierarchies. A Revised Bloom's Taxonomy introduced by Anderson et al. (2001) has incorporated learner-centred prototypes into the original Taxonomy, aimed at improving learners' comprehension. The cognitive process dimension retains six categories but with substantial changes. Basically, Bloom's six major features were changed from noun to verb forms to signify the importance of learner action. Additionally, knowledge from the old Taxonomy was renamed remembering in the Revised Taxonomy. In addition, the comprehension level of the original Taxonomy became understanding. However, the application/applying, analysis/applying and evaluation/evaluating Bloom's Taxonomy categories were preserved. Finally, the synthesis category was retitled to creating, and the order of synthesis/creating and evaluation/evaluating was interchanged in the Revised Taxonomy. In contrast to the original Taxonomy, the Revised Taxonomy (Anderson et al., 2001) allows the categories to overlap one another (Krathwohl 2002).

Research scholars and practitioners have proposed different learning activities designed base on the Revised Bloom's Taxonomy with the aim to enhance students' incremental learning. For example, Klebba and Hamilton (2007) introduced different tasks and instructions in a Marketing course based on the cognitive domains in Bloom's taxonomy. Another case in point is the layered teaching approach proposed by Albert and Grzeda (2015) who also use the Revised Bloom's taxonomy as a guideline. Although those teaching methods are different, all are designed based on the Revised Bloom's taxonomy which allows students' cognitive development through revising learned information. It is, therefore, believed that the approach will help students with incremental learning (Albert and Grzeda, 2015; Klebba and Hamilton, 2007). Empirical result shows significant different in critical thinking skills between students who attend the course integrated Bloom's taxonomy and those do not (Gokhale, 1995). Nevertheless, it is not sufficient to conclude the impact on incremental learning. Consequently, this paper takes into account the teaching method embedded the Revised Bloom's Taxonomy and strives to provide empirical evidence on its effect on incremental learning.

Case pedagogy

Case-based teaching method has a long-standing reputation and has been used extensively in a range of disciplines (Moreno and Park, 2010). Study indicates that students with incremental self-views of intelligence incline to favour team-based learning environment (Persky et al., 2015). Although each type of case-study represents different complexity domains, all have a certain impact on students' skill development (Grandon Gill, 2014). The utilisation of a case study is expected to promote self-study and collaborative learning, which will ameliorate cognitive skills, academic achievement and interpersonal skills. Furthermore, case-based learning combined with group problem-solving enhanced professional skills development (Harman et al., 2015). Structured case analysis develops a set of learning activities such as exercises, lectures, and limited problem solving into case analysis, and instructors can use it as a means of teaching in order to create an incremental learning process for students in team-based learning environment. With structured case analysis, Klebba and Hamilton (2007) implemented this pedagogy in a marketing case course and they found that a progressive and incremental process developed critical thinking and decision making. The learning process should be persistently supervised and incrementally enhanced (Aggarwal and Lynn, 2012).

Although there are evidences showed that case-based learning improved students' knowledge (Hilvano et al., 2014; Mishra et al., 2013), little research provides its impact on incremental learning. Case-based learning activities provide a contextual and often complex situation requiring students to apply theoretical principles to analyse the problems and consider possible solutions (Gullahorn, 1959). The real-life authentic contexts also provides opportunities for them to ameliorate critical thinking (Noblitt et al., 2010). Since case study allows students to recall the old information and critically review in application to a new context, it may as well facilitate the creation of new knowledge based on the previously learned one. To verify this proposition, this research is to examine the effect of case-based teaching method, integrates the Revised Bloom's taxonomy, on students' incremental learning.

2. Literature review

Incremental learning

Incremental learning is defined in terms of a paradigm for learning processes arising from new examples and adapting what has been learned to the new example(s) (Geng and Smith-Miles, 2009). As such, the incremental learning process is bearing on a limited number of examples. Thus, in each step, its hypothesis can be built upon these examples and other former examples are forgotten. Consequently, the inferred knowledge is retained longer than the given knowledge (Hulstijn, 1992; Mondria and Boer, 1991). For medical applications, the feasibility of an incremental learning ensemble algorithm, using support vector machines, enabled learning additional information from new data whilst retaining previously acquired knowledge. The iterative checking process prevented the loss of knowledge (García Molina et al., 2014). These principles suggest that students should learn incrementally.

In higher education, it is expected that structured learning could assist students in reaching the desired levels of skills at the higher levels of Bloom's Taxonomy (Warwick, 2008). The systematic and incremental teaching methods provide students with a mechanism for incremental learning. Wood et al. (2001) proposed an incremental development of design methods, and they found that these methods were advantageous to students' excitement and learning in the courses. Moreover, an incremental approach integrating Bloom's Taxonomy proposed by Albert and Grzeda (2015) stresses on the layered model in which students are expected to progress from data-driven exercises, reflection and critical thinking to the implementation exercises.

The Revised Bloom's Taxonomy

The Revised Bloom's Taxonomy (Anderson et al., 2001) affixed the knowledge dimension to the skeletal structure, which provided a further description of learning activities and assessments at the intersection of knowledge and cognitive process categories. Fiegel (2013) used the Revised Taxonomy for developing learning outcomes that were linked to lesson plans and assignments. The Revised Taxonomy was also used to teach a set of core knowledge learning objectives for accounting ethics education, and it was found to be beneficial to the course (Kidwell et al., 2012). The Revised Bloom's Taxonomy provides a framework that can be used to assure the provision of academic skills such as application, analysis, evaluation, and creation in delivered learning activities and assessments (Jideani and Jideani, 2012). The cognitive processes that underlie critical thinking are inextricably connected to subject matter, course content, and reflection (Hamilton and Klebba, 2011). Enquiry into best practices for developing learning objectives, activities and assessments, using the Revised Bloom's Taxonomy, still needs further examination to inform incremental courseware design.

The Revised Bloom's Taxonomy is applied to music education, which provides a framework for aligning learning objectives, curriculum, and assessment (Hanna, 2007). According to the Revised Bloom's Taxonomy, creativity is the highest level of learning, and in music education, the create process consists of three distinct areas: generate, plan, and procedure. Creativity has a positively possible effect on the field of music education. The Revised Bloom's Taxonomy is also used for organising a course systematically corresponding to the cognitive dimension including remember, understand, apply, analyse, evaluate, and create. Rohrdantz et al. (2014) employed it to teach visual analytics, and the learning objectives were comprised of application of learned methods (apply), project planning (analyse), evaluation of project outcome (evaluate), and presentation of methods and results (create). They found that the students favoured evaluating the design by attempting to solve a challenge. In addition, well-defined course content along with the assistance from the instructor is advantageous to incremental teaching and learning. For instance, Ling et al. (2014) designed a LearnStatistics app which assisted learners in learning statistical concepts. The app advocated learners' capabilities for remembering, understanding, and applying based on three lower levels of learning in the Revised Bloom's Taxonomy. The quiz scores for the remembering and understanding learning level were not significant different between the control group and the app group, whereas the quiz scores for the applying learning level was significantly different between two groups. Thus, it remains to be seen whether or not a lecture augmented with incremental learning activities can support higher-order thinking skills of the Revised Bloom's Taxonomy.

Between Revised Bloom's Taxonomy and incremental learning exists a potential linkage. In incremental learning, the process of learning continues even though the training is over (Bouchachia, 2010). Unlike other learning models that are one-shot experience, the knowledge in incremental learning is constantly updated (Bouchachia, 2009). When a new circumstance arises, the old knowledge is modified accordingly to adapt with it, leading to the development of the new knowledge (Geng and Smith-Miles, 2009). Therefore, the essence of incremental learning stays in the ability of creating new knowledge without forgetting the previously learned one (Bouchachia, 2011). This is similar to the objectives that the teaching activities designed based on the Revised Bloom's Taxonomy aim to achieve. Following the Revised Bloom's Taxonomy, teaching activities strive to help students remember the information (stage 1), apply it in the new context (stage 3) and create a new coherent form of knowledge or even a original product (stage 6) (Anderson et al., 2001). Consequently, as students move upward in the Revised Bloom's Taxonomy, they may as well achieve the incremental learning.

From the above discussion, we derive four constructs to measure the incremental learning based on the Revised Bloom's Taxonomy comprising of the four milestones: knowledge application, higher-order thinking, practice evaluation knowledge and knowledge improvement. We adopt a range of items from previous studies to measure each construct. Frick et al. (2010) developed an instrument to measure teaching and learning quality of which knowledge application is a part. Meanwhile, items to measure higher-order thinking are selected from Carini et al. (2006) who used this construct to studied students engagement. The selection of items for practice evaluation knowledge and knowledge improvement is based on the research about learning of Baker et al. (2011) and Fu et al. (2009). All the items statistically successfully loaded into its constructs, thus, well measure the corresponding latent variables. The validation of the measurement model in this study will be discussed in detail in the later sections.

Hypothesis development

Knowledge application and higher-order thinking

Higher-order thinking is said to occur when students interrelate, re-arrange and extend the knowledge stored in their memory (Lewis and Smith, 1993). The cognitive process involved with the higher-order thinking strategies directly associated with the employment of knowledge for problem-solving (Tennyson et al., 1987) which is why instructional method employing problem-solving can significantly improve students' higher order thinking (Hmelo and Ferrari, 1997). The available knowledge, however, is often inert and not used for problem-solving because of the structure deficit (Renkl et al., 1996). It is when the memorized knowledge lacks a deep-level of understanding or connections of information in different context in separated parts of memory, defined as a lack of application (Renkl et al., 1996). In that sense, if the students are able to apply their knowledge in a similar context, that body of knowledge then can be used for problem-solving which ultimately cultivates their higher order thinking. This leads us to hypothesise that the application of knowledge can improve students' higher order thinking.

Hypothesis 1: Knowledge application positively increases higher-order thinking.

Higher-order thinking and practice evaluation knowledge

The evaluation of knowledge requires students to show good judgement based on criteria and standards (Anderson et al., 2001). The process of evaluations provides students a chance to critisise their work (Marley, 2014) since it involves critical thinking (Halpern, 1989; Lewis and Smith, 1993). For a long time, critical thinking has been in confusion with higher order thinking (Lewis and Smith, 1993). Yet if it is considered as an evaluation or judgement, critical thinking stays under the umbrella of higher order thinking, together with systemic and creative thinking (Miri et al., 2007). In the same study, Miri et al. (2007) examined the use of teaching method to promote higher order thinking. The empirical evidence showed that the promotion of higher order thinking resulted in a lift in students' critical thinking skills. Consequently, we propose that higher order thinking, through improving critical thinking skills, can also help to increase the practice evaluation knowledge.

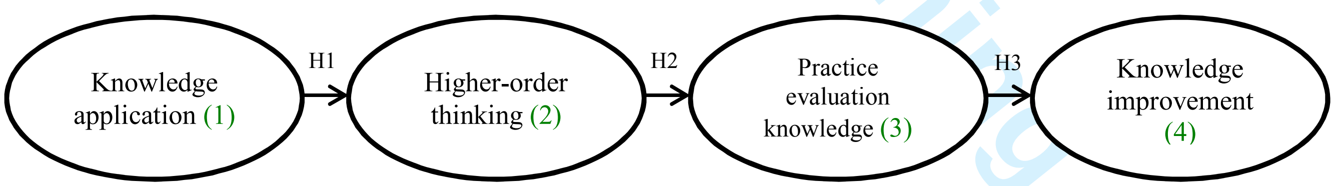
Hypothesis 2: Higher-order thinking positively increases practice evaluation knowledge.

Practice evaluation knowledge and knowledge improvement

Knowledge development is not simply a process of information transmission but rather a result of learning to think critically (Paul, 1990). Students learn by actively thinking their way to the final conclusion and generating insight along the way from which their knowledge accumulates (Paul, 1990). In line with this suggestion, Marley (2014) also indicated that through comparing their work with others, the evaluation process provides students with a learning step for improving their final product. As such, an evaluation process helps student to actively recognise the weaknesses in their work, or even a gap in their knowledge. From that, they would derive a strategy for improvement. For that reason, we propose that the act of checking and critiquing the knowledge against standards can have an impact on students' improvement of knowledge.

Hypothesis 3: Practice evaluation knowledge positively increases knowledge improvement.

The conceptual model and hypotheses are proposed as follows.



Key:
(1) Frick et al. (2010)
(2) Carini et al. (2006)
(3) Baker et al. (2011)
(4) Fu et al. (2009)

Figure 1. Conceptual model and hypotheses

3. Methodology

To test the hypotheses, the study employs quantitative methodology of which the primary data is collected using a self-administered questionnaire. After students completed The Internet for Business course in which the case study teaching method was implemented, they was asked to filled in a survey to evaluate their incremental learning. Details on how the course is designed based on the Revised Bloom's Taxonomy and the measures of incremental learning can be found in the following sections.

The data analysis employs Strutural Equation Modeling (SEM) following the two-step approach. In the two-step approach to SEM concerns two models, the measurement model and the structural model (Anderson and Gerbing, 1988). While the former examines the relationship between the indicators (items) and the latent variables (i.e knowledge application, higher order thinking, practice evaluation knowledge and knowledge improvement), the latter is the proposed model where the relationship between the latent variables is specify.

The advantage of using SEM is that this technique can estimate all the relationships simultaneously, therefore, can measure both the direct and indirect effects (Baek and Morimoto, 2012). In addition, SEM is superior in this particular research because it allows us to examines the relationships between latent variables while ensuring that they are well measured by the specified indicators. The approach will be discussed in more details in the later section.

Course introduction

The Internet for Business course at RMIT University provides students with an appreciation of 1) Knowledge and skills of the Internet and electronic commerce; and 2) How the Internet is affecting the world of business - locally and internationally. The aim of the course is to equip students with an understanding of the principles of the digital information network and how to apply Internet and online applications to support business functions, such as, marketing, accounting, finance and management. Discussion cases were developed to augment the Internet for Business curriculum. Students were also exposed to the principles of usability and had a chance to learn how to develop a simple website for a business. Hence, learning activities required students to remember, understand, apply, analyse, evaluate and create, which covers the entire range of the Revised Bloom's Taxonomy cognitive levels.

Activities in class

A key goal of the Internet for Business course is to ameliorate the student's understanding of materials covered during the course. To reach this goal, a set of learning activities and assessments were developed. Table I shows a variety of activities corresponding to different cognitive levels of the Revised Bloom's Taxonomy (Anderson et al. 2001).

Table I. Learning activities in class based on the Revised Bloom's category

Revised-Bloom's category / Learning activities	Knowledge	Comprehension	Application	Analysis	Evaluation	Creation
Lecture, reading	X					
Discussion, reflection		X				
Case studies in concrete situation			X			

Class discussions analysing the basic elements				X		
Devise a way to solve problems					X	
Conduct a debate						X

Instructors and students involvement

At first the instructor provided the fundamental concept related to Internet for Business along with a brief discussion and deep reflection containing comprehensive discipline – based knowledge. Afterwards, a case study was introduced to the students in class. The students were divided into small groups and requested to apply delivered knowledge and practiced cognitive processes in a concrete situation by identifying the problem presented in the case. Having studied the case, a rich picture was developed by each group in order to show relationships between stakeholders provided in the cases. This informative picture supported the students in comparing and contrasting. When the case was understood properly, each group devised a novel way to solve the problem. Eventually, each group presented their solutions in class. The class members of other groups and the instructor evaluated and questioned the solutions presented by the group. The nature of the presentation was a facilitated discussion requiring persuasive argument in the form of a debate. It was expected that the former activity could have a positive influence on the ability of students to complete the next set of activities in the suite delivered in the course. The incrementally gradual increase in levels of difficulty in the application of discipline knowledge and cognitive process according to the Revised Bloom's Taxonomy might put up the scaffolding of tasks and assessments. Actually, knowledge application and case analysis were tricky because for each case, the instructors gave different types of feedback or learning activities during the case discussions. However, after the case study analysis was conducted on paper, the students received written feedback to improve and correct their work along with further directions on preparation for case discussions. The provision of feedback was consistent but allowed for the creativity of student groups presenting potential solutions to the case study. During the discussions, the instructors used Socrative questioning techniques, which depended on cohort discussions occurring in the class.

Research design and data collection

Lectures and three real discussion cases were used for teaching in the Vietnam campuses. The structure starts from an overview of the case protagonist's industry in a global context, local context, organisation details, its products and competitors to lay the background information for students. Then the cases move on to investigating the challenges the case protagonists are facing, some alternative solutions possible and the time when the decision needs to be made. Each discussion case has different problems based on the modules learned in the class, such as, digital marketing, logistics, competitive strategies, etc.

After each level of cognitive process, a survey was conducted with a focus on the student perception of achievement of learning outcomes through engagement in the activities associated with the Revised Taxonomy-based learning strategy. Each participating student was given a choice between an online and a hard copy questionnaire in class after each learning activity. For consistency purpose, each respondent was required to fill in his/her student number in the questionnaire whenever they completed a survey. The students were assured that their responses would not affect their assessment grades at the end of this course. They were encouraged to participate in the survey voluntarily with no expected rewards. After a whole series of learning activities, 250 invites were sent out and the number of respondents who completed the questionnaire was 204 students, yielding a response rate of 82%.

Measures

Students' incremental learning outcomes were assessed by four measures. The survey instrument included scales on application, higher-order thinking, practice evaluation knowledge and knowledge improvement. Those scales attempted to measure level of application, analysis, evaluation, and creation respectively, according to the Revised Bloom's cognitive Taxonomy. The following items were modified from the original version and used to measure students' learning outcomes after activities designed for the use of case studies in class. Each item was rated on a Likert scale between 1 and 5, where 1 = strongly disagree and 5 = strongly agree.

Table II. The survey instrument

	Original items	Modified items
Knowledge application (Frick et al., 2010)	My instructor detected and corrected errors I was making when doing learning tasks, completing assignments, or solving problems.	Same as the original
	I had opportunities to practise or try out what I learned in this course.	
	My course instructor gave me feedback or appropriate coaching on what I was trying to learn.	
Higher-order thinking (Carini et al., 2006)	During the current school year, the extent coursework emphasized analyzing the basic elements of an idea, experience, or theory	While studying with case studies, the class discussions emphasised on synthesising and organizing ideas, information, or experiences into new, more complex interpretations and relationships.
	During the current school year, the extent coursework emphasized making judgments about the value of information, arguments, or methods	While studying with case studies, the class discussions emphasised on making judgments about the value of information, arguments, or methods.
	During the current school year, the extent coursework emphasized applying theories or concepts to practical problems or in new situation.	While studying with case studies, the class discussions emphasised on applying theories or concepts to practical problems or in new situations
Practice knowledge evaluation (Baker et al., 2011)	I have been adequately trained to conduct practice evaluation.	By the end of the semester, I have been adequately trained to evaluate options in e-business contexts.
	I am able to identify an evaluation outcome	I am able to identify and evaluate the outcomes of e-business strategies.
	I am able to locate measures and scales to assist in evaluation	By the end of the semester, I am comfortable with my knowledge of evaluating options in e-business contexts.
	I am comfortable with data analysis techniques	I am comfortable with the process of evaluating e-business strategies.
Knowledge improvement (Fu et al., 2009)	The game increases my knowledge	The case studies increase my knowledge.
	I catch the basic ideas of the knowledge taught	Same as the original
	I try to apply the knowledge in the game	I try to apply the knowledge learned in the case studies.
	The game motivates the player to integrate the knowledge taught	The case studies motivate me to integrate the knowledge taught

Data analysis method

A developmentally learning approach in which the students were provided an occasion to develop skills in a systematic way was able to reinforce self-efficacy and satisfaction with the learning process. Based on the foregoing strategy along with the above learning activities, it is believed to advocate the development of higher-level cognitive skills. In order to impute relationships, structural equation modelling (SEM) technique was employed to test the hypotheses using data collected from the respondents. SEM provides plausible explanation for relations between student perception of practice activities connected to the Revised Bloom's category. Software Amos 20 was used to specify, estimate, assess and present models for showing the results of hypothesised relationships among variables.

4. Results

Before assessing the structural model validity, the measurement model was assessed through construct validity and construct reliability (Hulland, 1999). Construct validity refers to a set of measured items reflecting a variable (McQuitty and Wolf, 2013), which is assessed by convergence validity and discriminant validity. When examining convergent validity, average variance extracted (AVE) and composite reliability (CR) were examined (Hair et al., 1998). The AVE values, presented in Table III, reached the recommended cut-off value of 0.5 (Fornell and Bookstein 1982), and the CR scores of the reflective constructs, demonstrated in Table III, almost reached the threshold of 0.7 (Nunnally, 1978). Another component of construct validity is discriminant validity, the extent to which a constructs different from others (McQuitty and Wolf, 2013). The discriminant validity was tested by comparing the square roots of AVE value for each factor with the shared variance between constructs. Table IV displays the discriminant validity analysis. Almost all square roots of the AVE scores are equal or greater than its shared variance with any other construct; discriminant validity is supported (Fornell, 1987). Next, construct reliability, a measure of the internal consistency of the observed variables (McQuitty and Wolf, 2013), is measured by Cronbach's coefficient alpha. The values of alpha are over 0.7 (Table V), which are in the acceptable range (Tavakol and Dennick, 2011). Taken together, the evidence provides initial support for the measurement model.

Table III. Assessment of convergent validity

	Application	Higher-order thinking	Practice evaluation knowledge	Knowledge improvement
Average variance extracted (AVE)	0.7	0.6	0.5	0.5
Construct reliability (CR)	0.8	0.7	0.7	0.6

Table IV. Assessment of discriminant validity

	Variable	1	2	3	4
1	Application	**0.8***			
2	Higher-order thinking	0.6	**0.8**		
3	Practice evaluation knowledge	0.6	0.8	**0.7**	
4	Knowledge improvement	0.6	0.8	0.7	**0.7**

*Bold values on the diagonal are square roots of AVE of constructs.

Table V. Assessment of construct reliability

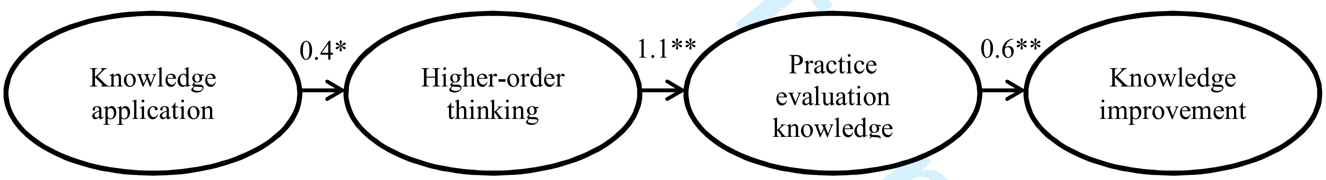
	Variable	Cronbach's coefficient alpha
1	Application	0.9
2	Higher-order thinking	0.8
3	Practice evaluation knowledge	0.8
4	Knowledge improvement	0.8

In order to measure how well the proposed model fits the data, a variety of fit indices were used for prospective SEM. Hooper et al. (2008) presented a selection of fit indices for assessing model fit, which are absolute fit indices and incremental fit indices. The absolute fit indices include Chi-Square $\chi 2$, relative $\chi 2$ ($\chi 2$/df), root mean square error of approximation (RMSEA), adjusted goodness-of-fit-index (AGFI), and standardised root mean square residual (SRMR). The incremental fit indices comprise Tucker-Lewis index (TLI), and comparative fit index (CFI). Table VI presents the fit indices and computed results. As shown in Table VI, the computed results are all within acceptable range. It shows the fit of proposed model to the data collected.

Table VI. Fit indices for the full model

Fit Index	Computed Result	Acceptable Threshold Level	Supporting Literature
Absolute Fit Indices			
Chi-Square χ^2	p-value = 0.23	p-value > 0.05	Barrett (2007)
Relative χ^2 (χ^2/df)	1.12	< 2	Tabachnick and Fidell (2007)
RMSEA	0.02	< 0.07	Steiger (2007)
AGFI	0.92	> 0.90	Hooper et al. (2008)
SRMR	0.05	< 0.08	Hu and Bentler (1999)
Incremental fit indices			
TLI	0.93	> 0.90	Hopwood and Donnellan (2010)
CFI	0.95	> 0.90	Hopwood and Donnellan (2010)

After examining the fit indices that evaluate the fit between the model and the data, the direction and significance of hypothesised relationships among constructs were elaborated (McQuitty and Wolf, 2013). As shown in Fig. 2, knowledge application positively increases higher-order thinking (H1: $\beta = 0.4$, $p < 0.05$). Higher-order thinking positively increases practice evaluation knowledge (H2: $\beta = 1.1$, $p < 0.01$). Finally, practice evaluation knowledge positively increases knowledge improvement (H3: $\beta = 0.6$, $p < 0.01$). According to the positive outcomes of proposed relationships in the model, incremental learning process of case study analysis advances the students' skills.



Notes: *, and ** denote significance at 5%, and 1% confidence level

Figure 2. Results of the structural model

5. Discussion

The discussion cases used in this study were real business problems and written to match the modules taught in the class. The students prepared the case study analysis in small groups outside the class before coming to class for discussion. Once inside the classroom, they acted as a representative from their previous group to join new groups and shared their results with the new group which formed at the beginning of the discussion class. This way, the students could analyse and evaluate ideas from various points of views. The case focused on the higher-order thinking skills according to Bloom's Revised Taxonomy of objectives. Therefore, the student applied theory they learned to an unaccustomed situation with a range of planned instructions. Our empirical result demonstrates that by doing so, students' higher-order thinking can be stimulated. This is in line with Rathy (2013)'s work which showed a curriculum including coordinated and articulated instructions resulting in the achievement of skills and knowledge application (Rathy, 2013).

In this study, by having the students submit their discussion case analysis, which included the rich picture prior to case discussion in the class, the students were better prepared to evaluate their findings in comparison to the results from other groups. An opportunity to listen to ideas from other perspectives and dimensions, and ability to defend their ideas was by in-class debates. The systematic activities and assignments in the order of cognitive skills of the Bloom's Revised Taxonomy prepare students with higher-order thinking skills (Soleimani and Kheiri, 2016) and judging and resolving skills (Dabbagh and Dass, 2013). In our current study, this was verified by the significant relationship between higher-order thinking skills and the practice evaluation knowledge.

The students of this study found that case studies helped them to better understand complex theories and also enabled them to link other business theories learned from previous courses, namely, Marketing Principles, Macroeconomics I, Prices and Market as well as Accounting in Organisations and Society, etc. The students were able to link the theories to the case studies correctly. In comparison to other types of teaching methods, the case-based approach made student's more confident in suggesting solutions and coming up with innovative ideas and workable solutions that took organisational risks into account. Localised real case studies allow students to see the real-world issues and the relevance of fields (Yadav et al., 2014).

6. Conclusion

The present study generalised employing case studies, based on the Revised Taxonomy, to produce the desired effects of incremental learning in teaching and scaffolding learning activities in Internet for Business. The case study method stressed developmental skills in conceptual analysis, interactions and decision-making. Case information stipulated a circumstance or a problem and it was necessary to propose a pertinent solution for it. The skill performance was expressed in the application of knowledge to practice in case-based model. The instructors, meanwhile, were accountable for assisting the students in diagnosing problems and in prescribing viable solutions.

According to the findings from this research, the cases, coming from and involving local organisations where the students relate to their real lives, help the students develop a higher-order learning approach. Having the students work in small groups prior to class discussion provides the students some peer pressure to complete the discussion case assignment well and on time as they need to be prepared for a debate during the tutorial classes. The time and incentives given to the students should also be ample enough to motivate and encourage them to perform their best abilities. Moreover, since there is no right or wrong answer for such a discussion case, the instructor should act as a facilitator to lead and conclude the discussion in harmony as well as make sure that all the students receive an equal opportunity to speak up and share their ideas.

Even though knowledge of the Taxonomy is able to develop skills incrementally, knowledge sharing and knowledge creation are both important competences that have yet to be studied. For future research, knowledge sharing or knowledge creation that could happen during this process needs to be investigated, and their potential impact on course design should be considered.

Author Biographies

Mathews Nkhoma is Head of Department for Business Information Technology and Logistics at RMIT University Vietnam. His major topics of research are: Zero day attacks and vulnerability research, Information Systems Security, Transparency in information security system design, Network security investment model, Ethical hacking and Network defence, Network security management, Forensic Computing and evidence recovery including mobile devices, Cybercrime, Identity theft, consumer protection, trust and confidence, Impact of ICT in edu-cation.

Narumon Sriratanaviriyakul is responsible for leading academic and professional excellence of RMIT Vietnam with a focus on teaching and the student experience in the classroom; demonstrating performance of innovation in teaching, enhancing the quality of student learning outcomes and developing a supportive and collaborative learning; maintaining currency in relevant disciplines and areas of professional practice and is not required to maintain a program of independent research; Leading the development, promotion and delivery of courses and programs in collaboration with course and program leaders at RMIT Vietnam and RMIT; leading development of a teaching and learning environment that is based on sound pedagogical principles, disciplinary and professional expertise and connections with industry; leading the implementation of RMIT academic policies in relation to approaches to teaching and learning, assessment of student performance, student feedback and program and course design; leading continuous improvement processes in teaching and learning; leading the development of course teams and program teams.

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