

Exploring Students' Choice of Theories as Tools in Problem-Solving: A Pilot Study

Airi Rovio-Johansson
University of Gothenburg

Roy Liff
University of Gothenburg

Gustavo Guzman
Griffith University

The purpose of this article is to explore why work-experienced students with up to 20 years of experience may not change their perception of professional practice when subsequently participating in practice-based learning programmes in higher education. We investigated the role of the degree of codification as operationalisation in how students choose theories to solve a practical management problem. When selecting a theory, work-experienced students may overlook the degree of codification in the theory that enables its use as an analytical tool. Previous research on novices or work-experienced students has not investigated their learning outcomes considering the features of theories students need to apply. Research findings indicate that students' understanding of theories affects their selection of theories and their problem-solving practice. This study extends previous research on work-experienced students' learning and contributes to the international discussion on why work-experienced students encounter difficulties in professional and practice-based learning in higher education.

Practice-based learning is one form of learning in higher education, expected to improve students' understanding of conceptual frameworks and to enhance their ability to solve problems in simulated real-world situations (Billett, 2015; Gherardi, 2016; Higgs, 2012). The integration of theory and practice, along with the inclusion of practice-based experiences in higher education, is in demand by society, industry, and employers (Balconi, Pozzali & Viale, 2007; Lazaric, Mangolte & Massue, 2003; Raelin, 2008). This is not new for engineers, teachers, lawyers, doctors, dentists, nurses, or psychologists who have practice included in their higher education programmes.

Research shows, however, that work-experienced students do not change their perception of professional practice during their studies, even if periods of practice result in more experiences (Handal & Hofgaard Lycke, 2005). Gulikers, Bastiaens, & Kirschner, (2004) and Gulikers, Kester, Kirschner, & Bastiaens, (2008) report that work-experienced students claimed that they did not need to perform the analytic steps they were taught to perform an assessment task. Rather, they could do it based on their prior work experience. Work-experienced students "simply felt that there was less to learn because of their previous experiences in professional practice" (Gulikers et al., 2008, p. 182). Research suggests that work-experienced students have less need of theories to guide analyses of authentic cases of practical problems than inexperienced novice students and that they have less to learn from solving practical problems (Govaerts, van der Vleuten, Schuwirth, & Muijtjens, 2005; Gulikers et al., 2008).

Experience is considered central in learning (Tight, 2009); however, experience as such is not enough for learning to take place. Wrenn and Wrenn (2009) state that "while experience is a great teacher, it cannot replace what can be best taught in a classroom and vice versa" (p. 258). March (2010) noted that experience can be useful in cases of replicating actions and routines, but it

is not a good teacher in situations with few repetitions (i.e., unique events, events with changing conditions and context). Consequently, it is important to investigate the learning path for different groups of students.

The traditional professional education path of learning for students at the undergraduate level is from knowledge to practice, i.e., dentists, physicians, and engineers. In the current study, we focus on how work-experienced students in a Public Administration undergraduate course cope with learning of the course content. These work-experienced students are expected by employers to learn new theoretical knowledge and gain theoretical tools to improve their occupational capabilities in authentic work situations. Accordingly, the learning path for work-experienced students is from practice (before) to knowledge to practice (after).

To the best of our knowledge, few scholars (e.g., Liff & Rovio-Johansson, 2014) have investigated student understanding of the concept of theory in the sequence practice (before) theory/knowledge practice (after). Liff and Rovio-Johansson (2014) made the data from a previous study available to us. However, because the focus of the previous study was on how a selected theory was used in solving the authentic practical problem, the management theories students selected were never analysed. Previous results will be further expounded in section Method.

The purpose of the current study is to provide an explanation of why work-experienced students in higher education may not change their perception of professional practice when participating in practice-based learning in higher education. The current study investigates the nature of knowledge, or the degree of codification and operationalisation, associated with the theories students select to solve a practical management problem and the role the degree of codification and operationalisation plays in students' understanding and application of theory. The study relates to specific management theories in student textbooks, referred to

as textbook management theories that students apply in solving practical, authentic management problems. It may be assumed that the more explicit the theory is in providing causal links in guiding operations and the more precise it is in describing know-how (procedural knowledge), the more helpful it will be for practical purposes, i.e., the operationalisation of theory, describing how to perform a practical action. Zollo and Winter (2002) defined codified knowledge, which is used as the concept here, to define the degree of codification and operationalisation of a theory, as documented knowledge in manuals and descriptions of tools about how to execute a complex task to achieve a desired performance and especially how to develop operating routines. We investigated what Zollo and Winter (2002) called the degree of codification associated with those textbook management theories.

Accordingly, the current study expands upon the previous study in order to develop and examine: (a) the specific textbook management theories that students applied in solving a practical authentic management problem in a written examination; and (b) students' understanding of textbook management theories with regard to their degree of knowledge codification, or when they choose the theory and how this theory affects their examination results.

Practice-based learning

The integration of practice-based learning into higher education has major implications for academic teachers' teaching and their development as academics. In higher education, a program or a course usually consists of a curriculum with a broader scope on subjects, a defined time span, and specified learning outcomes for students (Tight, 2009). As Evans and Guile (2012) argue, discipline-based knowledge has a different logic compared to practice-based knowledge. The former develops through discipline-based research and the latter through procedural and highly codified knowledge systems (i.e., technological and organisation specific systems). Thus, from the students' perspective, one can receive knowledge through teaching and studying, and knowing from practice-based learning (Gherardi, 2016; Schatzki, Knorr Cetina & Von Savigny, 2001).

In higher education, research on practice-based learning may include educational practices such as supervision in situ, supervised laboratory work, and engaging students in reflective work on authentic case descriptions (Billett, 2015; Boud, 2012; Higgs, 2012). Scholars use practice to mean occupational practice, encompassing the various practices that comprise occupations such as professions. Accordingly, research on practice-based learning in higher education has shown that students obtain new knowledge, expand values, and develop capabilities and understanding,

which constitute the foundations for how they engage with what they experience and learn in both settings (in higher education and in work).

Through taking part in practice-based learning, novice students learn (a) by observing experienced mentor actions in authentic work situations and (b) from experienced mentors' feedback on student experimentation in laboratories and performance in authentic work activities (Raelin, 2008; Revans, 1966). Teachers have the discipline-based knowledge but not always the knowing. Gherardi and Miele (2018) argue that "knowing is an activity that is embodied and embedded, and emerges from situated practices" of which teachers may lack experience (p. 162).

The focus of the current study adheres, however, to the kind of learning and professional development, which extends and improves work-experienced students' knowledge and professional development, which is a more difficult situation for work-experienced students than for the novices (Gulikers et al., 2004). Some scholars claim that students do not change their perception of professional practice during their studies even if periods of practice result in more experiences (Handal & Hofgaard Lycke 2005).

Other scholars have suggested that the learner's level of work experience is a critical factor in determining what information is relevant for the learner (Gulikers et al., 2004; Gulikers et al., 2008) and what information is attended to (Chi & Glaser, 1985). Gulikers et al. (2008) studied two groups of students who differed in their practical work experiences. Research findings suggest that work-experienced students referred to their experiences in practice: they claimed that their better examination results compared to the novices' results were due to the fact that they did not need to perform the analytic steps of the assessment to successfully perform the assessment task based on their work experiences. Work-experienced students "reported developing fewer professional skills than freshmen [novices] in response to the assessment [... and] simply felt that there was less to learn because of their previous experiences in professional practice" (Gulikers et al. 2008, p. 182).

Research on novices learning from practice-based learning in higher education indicates that just having workplace experiences is insufficient. Students need support to connect their experiences after practice to discipline-based knowledge. Further, students' personal epistemologies are central (i.e., what they know, can do, and value) in developing their readiness (interest, capacity) to participate in theoretical learning and practice-based learning (Billett, 2015, pp. 135-136 and p. 225). In the same way, research on work-experienced students' learning has indicated that they have less need of theories to guide analyses of authentic cases of practical problems than novices and they learn less

from practical problems (Gulikers, et al., 2008). Nevertheless, previous research has neither investigated novices nor work-experienced students' learning outcomes from practice-based learning perspective related to the pertinent features of the theoretical content of academic courses such as degree of codification and operationalisation of theories.

The degree of knowledge codification

Textbooks management theories are explicit knowledge (Zollo & Winter, 2002): knowledge that is conscious, declarative, and has well known cause and effect relationships. This form of explicit knowledge can exist as documents or inscribed in machinery independent of people (Balconi et al., 2007; Hislop, 2005). Explicit knowledge can be codified or operationalised in different degrees (Balconi et al., 2007; Nightingale, 2003), albeit most of the literature overlooks this (e.g., Davenport & Prusak, 1998; Guzman & Trivelato, 2011). According to Zollo (1998), knowledge codification is:

The degree to which the accumulated experience is analysed, abstracted, and incorporated in check-lists, manuals, blueprints, computer programmes, etc., that provide the content ("know-what"), the methodology ("know-how"), and eventually the rationale ("know-why") for the execution of a certain task. (p. 26)

Some forms of knowledge are easy to codify (i.e., explaining how to perform a payment in a small business) and others difficult (i.e., developing a detailed explanation for situations in which it was necessary to break a rule). Authors of textbooks are able to abstract and codify management theories to different extents because they are "not able to make fully explicit all the ideas, assumptions, theoretical frameworks and values that underpin what they want to write" (Hislop, 2005, p. 30). There are two reasons for this. First, because there are too many contingencies associated with the application of a textbook management theory in a particular situation, it is not possible to cover all possibilities. Second, highly abstract concepts are affected by the indeterminacy of translation. Hence, components of knowledge that involve competences, skills (i.e., perception, inductive and deductive inferences, kinetic and motor skills) are difficult to codify, since there are no codes (language) to describe competences and implicit cognitive rules. This means that a complete degree of codification of a management theory in a textbook would involve the representation with words of all information and behavioural rules necessary to achieve a practical goal (Balconi et al., 2007).

It may not only be difficult for students to codify a theory, but also for them to notice the degree of codification and operationalisation associated with the specific textbook management theory and to realize the relevance of the codification. When students are selecting a theory to solve a practical problem, we may assume they are looking for a theory describing similar kinds of situations as they have experienced. They may overlook the relevance of different degrees of knowledge codification among theories. We can say it is not a trivial matter to select a theory.

We assume the more codified a theory is, the more helpful and easy it is to use as an analytical tool to understand a practical situation. The first step is to investigate if there is any difference in the degree of codification and operationalisation between the chosen theories. To do this, we need to identify the criteria for codification. We come back to this problem in the next section.

Method

Previous study

The starting point of the current study is the previous study conducted by Liff and Rovio-Johansson (2014), who examined students' understanding of theories in a course offered to students in higher education. The research question was: What does theory mean to students? After the examination, students were interviewed and asked about theory they applied to the problem they were asked to solve.

Course and participants. The course was the introductory course in higher education for a part-time Healthcare Management Program, in a Nordic European School of Public Administration. It was offered to employed healthcare professionals enrolled in medicine, public health, or social science programmes: primarily nurses, psychologists, occupational therapists, or physiotherapists, ranging in age from 35 to 50 years, many of whom are middle managers.

The course comprised of six lectures and two seminars. An introductory lecture on management theory was followed by a discussion on formative episodes, in which students analysed each other's actual workplace cases. Thereafter, in the examination task, students were asked to analyze a case based on their experience as healthcare practitioners, by identifying and addressing the theoretical concepts in the case, weaving theory and practice in their solutions. They were required to employ the cause-and-effect mechanism in the theory to explain the problematic situation in their case. Application of theory involved adequate judgement about the alignment of key elements of the situation, core characteristics of their

chosen theory, and the relevance and adequacy of that theory to help explain a situation.

The structure of the course provided students with an opportunity to use theory as an analytical tool and to solve management problems that students were likely to encounter as managers and co-workers. Thus, the course had both practical and theoretical content. However, the teacher provided no information on how to choose the theory. The course literature comprised two books: Jacobsen and Thorsvik (2002), *How Modern Organisations Work* and Siverbo (2007), *Democratic and Effective Control: An Anthology of Research in Public Management*.

The students participating in the previous study were six women, hospital employees aged: 31, 53, and 45 years old; and healthcare centre employees aged: 31, 46, and 35 years old.

Phenomenography, analysis, and findings.

Phenomenography is a qualitative research approach and a non-dualistic ontological framework which is used as the rationale in the analysis of students' examination results in the previous study (Marton, 2015). This phenomenographic analysis focuses on students' interview answers to investigate the qualitatively different ways in which students understand the concept theory (Cheng, 2016; Rovio-Johansson, 2016).

The phenomenographic analysis revealed two levels of students' understandings of theory. Level One (L1) students' answers exposed an understanding of theory as book knowledge and they were able to use only the core elements of a theory, without understanding its relevance and adequacy in explaining the situation described in the case for their analysis. Level Two (L2) students understood theory as a tool for exploring a situation and were able to differentiate the relevance and adequacy of a theory to solve their examination problem. Furthermore, the phenomenographic analysis revealed the qualitative variation of meanings students gave to the concept theory, related to the students' examination results. In the assessment of the examination results of the previous study, L1s were graded Fail and Pass, and L2s were graded High Pass.

Based on the examination outcomes in this previous study, it was possible to hypothesize that the student's perceptions of theory, book knowledge versus a tool for understanding and exploring the case, could provide an explanation for the examination results.

Current study

The current study extends the results of the previous study a step further with the hypothesis that the students' perceptions of theory as a general concept may not only influence the use of theory but also the choice of theory. The choice of theory may in turn also influence the examination results. We hypothesise that

the degree of codification (operationalisation) of the chosen theory may influence the use and the outcome of the analysis. Thus, the current study analyses the degree of codification associated with the textbook theories that students in the previous study chose to use to analyse their case study (examination problem).

Method for analysing textbooks. The systematic study of the content and the structure of the textbook reveals the meaning of the book content to the reader. The qualitative text analysis begins with several mentions of the management theories in the course book. The intention is then to find the inherent meaning of the text, which often can be hiding under the surface, reachable only through repeated close reading (Czarniawska, 1997).

The systematic analysis of the degree of codification and operationalisation associated with three selected textbook management theories involved two steps. In the first step, we systemized the content of the theory according to the stated definition of codified knowledge in the introduction. Codified knowledge gives the answers to the questions know-what and know-how like a manual. This involved the application of three criteria to identify the codification as operationalisation level of the theory: 1) the extent to which theory is able to formalise rules (Hislop, 2005; Lazaric et al., 2003; Zollo & Winter, 2002); 2) is situation specific, or informs about which situations it can be applied to depending on the underpinning assumptions of the theory; and 3) handles causal ambiguity, or the extent to which theory is able to provide different possible cause and effect relations, which have to be tested (Zollo, 1998; Zollo & Winter, 2002).

We applied the criteria to each of the selected theories at prima facie to identify the extent to which each theory adhered to the criteria. Hence, we examined the three management theories as they were written in the two course textbooks. In the second step, we critically analysed whether the theory provided a causal relation between leadership action and its effect in different situations; and further, whether it was operationalised for analysis of empirical data.

Analysis of management theories

Max Weber's bureaucracy theory

Max Weber studied power and authority in public sector organisations. He observed three types of authority: traditional, based on the belief that the ruler has the natural right to rule; charismatic, grounded in the belief that the ruler has special virtues to rule; and legitimate, centered on formal written rational rules (Jacobsen and Thorsvik, 2002; Siverbo, 2007).

His theory primarily concerns the main characteristics of bureaucratic organisations aimed at achieving organisational efficiency (Jacobsen and

Table 1
Knowledge Codification Levels of Textbook Theories

| Criteria and degree of knowledge codification | Max Weber | Hersey & Blanchard (H & B) | Fiedler |
|---|-----------|----------------------------|---------|
| Formalised rules | XX** | XX** | XXX*** |
| Situation specific | X* | XX** | XXX*** |
| Handle causal ambiguity | X* | XX** | XX** |
| Summary of knowledge codification | LOW | MEDIUM | HIGH |

Note. *=Low codification level; **=Medium codification level; ***=High codification level;

Thorsvik, 2002; Siverbo, 2007). The level of knowledge codification for this theory is assessed as Low (Table 1).

Hersey and Blanchard's situational leadership theory

Hersey and Blanchard discuss the leader's task behaviour (amount of direction the leader provides to subordinates) and support behaviour (amount of social support the leader provides to subordinates), considering subordinates' readiness to perform certain tasks (Jacobsen & Thorsvik, 2002; Siverbo, 2007). Based on those relationships, they discerned four leadership styles: telling, selling, participating, and delegating: telling means explaining to subordinates how to solve tasks with little support behaviour; selling involves high task and support behaviours; participating encompasses low task and high support behaviours; and delegating entails low task and low support behaviours.

The subordinates' readiness to perform a particular task relates to these leadership styles. When readiness is high (subordinates are both willing and able to perform tasks), the delegating style is adequate. If subordinates are able but unwilling, the participating style is suitable. Similarly, when subordinates are unable but willing, the selling style seems appropriate. When readiness is low (subordinates are unable and unwilling to perform tasks), the telling style is most useful (Jacobsen & Thorsvik, 2002; Siverbo, 2007). The level of knowledge codification associated with this theory is assessed Medium (Table 1).

Fiedler's leadership contingency theory

This theory relates leaders' behaviours, tasks, and contextual aspects (Jacobsen & Thorsvik, 2002; Siverbo, 2007). Fiedler established relationships between the degree to which tasks are structured, the leader's power position, and the nature of leader-subordinate relations. Consequently, the leader has two possible leadership styles: a task-oriented style in which task-related details are important, or a people-oriented leadership style, in which interpersonal relationships are important.

Three contextual scenarios in which the leadership style may be effective according to Fiedler: 1) When

the task has a high level of structure, the leaders' position on power is high, and leader-subordinate relationships are positive; 2) when the task has a low level of structure, the leader's power position is high, and leader-subordinate relationships are positive; 3) when the task has a low level of structure, the leader has a low power position, and leader-subordinate relationships are poor. It is recommended that the leader adapt a task-oriented leadership style in scenario 1 and 3 and a people-oriented leadership style in scenario 2. The level of knowledge codification for Fiedler's theory is assessed as High (Table 1).

Results

Degree of codification

In this section, we determine the degree of codification and operationalisation associated with textbook management theories, considering the extent to which a textbook theory is able to formalise cause-effect rules, is situation specific, and can handle causal ambiguity.

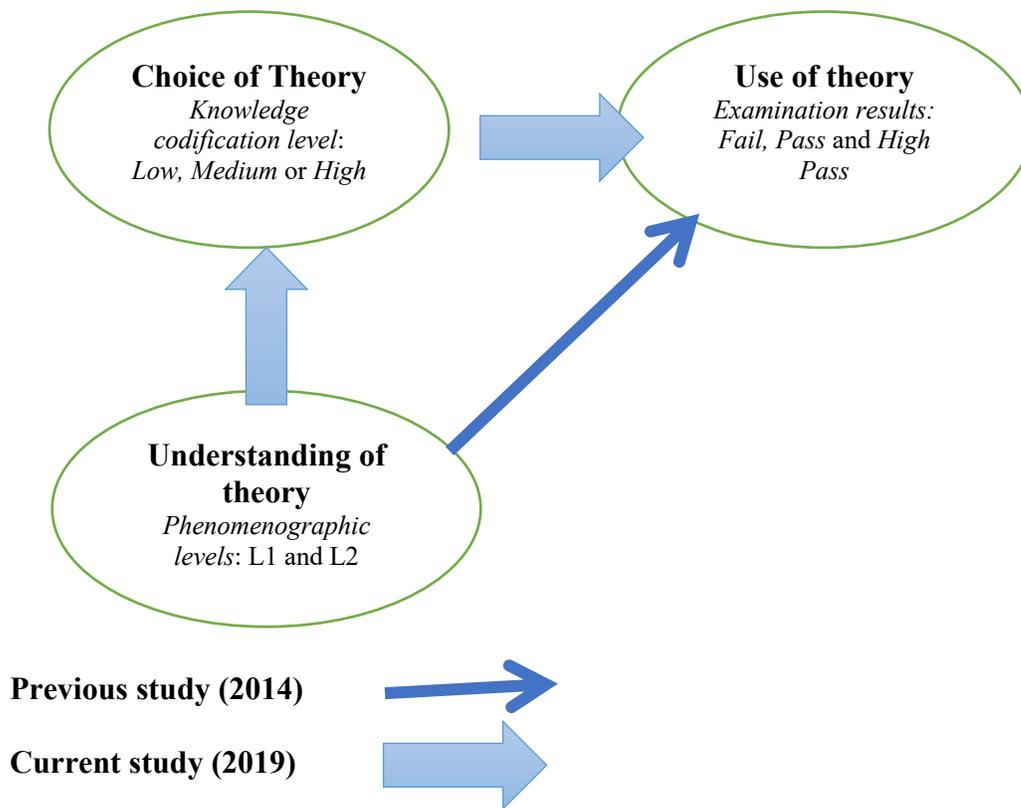
Weber's bureaucracy theory is considered as having a medium codification level for formalised rules. This theory is formalised in generic rules, such as those concerning promotion and recruitment of co-workers, ways of setting salaries, and several structuring and control principles. However, because there are too many ways of applying a plethora of general rules, the theory was classified as medium codification level for formalised rules. The extent to which Weber's textbook theory is situation specific is considered as low codification. Although the textbook introduces Weber's bureaucratic model as based on an "ideal" type of organisation that no longer exists and cannot be applied in diverse contexts, it is unclear whether Weber's theory can be applied in today's organisations. While the textbook provides a brief historical account of Weber's theory, its contextual aspects are largely overlooked. In relation to the extent to which Weber's textbook theory can handle causal ambiguity, it was categorised as low degree of codification. The main reason is that the textbook description of Weber's principles says what to do, but there are few explanations on why or how.

Table 2
Students' Examination Results Related to Degree of Knowledge Codification

| Degree of knowledge codification | Examination Results | | |
|----------------------------------|---------------------|-----------------|---------------------------------------|
| | Fail* (Level1) | Pass* (Level1) | High Pass (Level 2) |
| LOW (Weber) | | Student 3/Weber | |
| MEDIUM (H&B) | Student 5/H & B | Student 4/H & B | |
| HIGH (Fiedler) | | | Student 1/Fiedler Student2/Fiedler |
| No theory applied | Student 6 | | |

Note. * The results in these two columns are merged to one column in the previous study (Liff & Rovio-Johansson, 2014).

Figure 1
Students' problem-solving process in the previous and current study



The Hersey and Blanchard (H & B) situational leadership theory has formalised rules about appropriate leadership styles, depending on the subordinates' readiness to perform their tasks under any of the four leadership styles. However, because those rules require a relatively complicated analytical procedure for deciding in which of the four states the subordinates are located and can even be located in one state of readiness, H & B theory was judged to be at a medium codification level regarding formalised rules. Concerning situation specificity, H & B textbook theory

is classified as having medium level of codification. H & B theory considers several archetypical leader-subordinate relationships (it uses generic categories of leader behaviour task and four levels of follower readiness) and can help leaders to adapt their behaviour, depending on a narrow set of elaborately defined situations. In this sense, this theory was relatively specific for a situation and classified as having a medium level of codification. Regarding the extent to which H & B theory can handle causal ambiguity, this theory was again classified as having a medium degree

of codification. While the H & B textbook theory gives details, to some extent, on what and how (i.e., objective of theory and four types of leader behaviour are described in clear and simple terms), it falls short in explaining the rationale for the main ideas.

Fiedler's leadership contingency theory was classified as having a high codification level, in terms of formalised rules. Key concepts to be used in determining a scenario are relatively well explained in the textbook. Thus, the "what" and "how" are addressed. Regarding situation specific criteria, Fiedler's theory is classified as having a high level of codification since it considers a limited number of elaborately defined contextual conditions (two leadership styles in three contextual scenarios) in which it can be applied. With respect to the extent to which Fiedler's theory can handle causal ambiguity, it was considered as having a medium degree of codification. Whilst Fiedler's theory explains key aspects of the connections between leadership styles and the contextual situation, some aspects remain unelaborated.

To summarise: The examination of the extent to which textbook theories are codified revealed a low codification level for Weber's bureaucracy theory, a medium codification level for H & B theory and a high codification level for Fiedler's contingency theory (Table 1).

There are three main conclusions: First, the examination results indicate that student understanding of theory is crucial for: 1) selecting the adequate theory to explain a problem and 2) using the selected theory to solve the problem. Second, the degree of codification of selected theories influences the use of theory and thus examination results. Third, we conclude that: 1) understanding theory, 2) choice of theory, 3) use of theory, and 4) learning outcomes (examination results) are interrelated variables. These conclusions suggest that understanding of theory is one of the basic explanations for the different learning outcomes.

Choice of theory and examination results

Table 2 relates students' examination results, degree of knowledge codification and their choice of theory.

To understand the differences in students' examination results, Liff and Rovio-Johansson's (2014) findings were compared with the levels of codified knowledge of the theories. Two insights emerged: First, both L1 and L2 students used theories with medium and high degrees of codified knowledge (H & B and Fiedler) and still obtained different examination results, suggesting that there are aspects beyond the degree of knowledge codification associated with the theories that explain students' understanding of theories (the thin arrow in Figure 1).

Second, the codification level associated with the theories may be connected to students' understanding of those theories. Student 3 (S3), who achieved a *Pass*, used

Weber's theory – a theory judged as having a low degree of codified knowledge. This suggests that textbook theories with low degrees of codification (i.e., abstract theories) are more difficult to apply than theories with high degree of codification (i.e., less abstract theories).

In the problem-solving process during the examination, there were students who searched for superficial similarities between their empirical material and the knowledge elements of the management theories they choose. The findings suggest that these students made two mistakes, first in their choice of theory and second in their application of the selected theory.

Discussion

The literature has recognised that discipline-based knowledge has a different logic, compared to research on practice-based knowledge (Evans & Guile, 2012). While the former develops through discipline-based research, the latter develops through procedural and highly technological and codified knowledge systems. From the students' perspective, you get knowledge through teaching and studying, and knowing from practice-based learning, as has been elaborated in previous research (Billett, 2012, 2014; Boud, 2012; Gherardi, 2016; Gulikers et al., 2004; Higgs, 2012; Raelin, 2008; Revans, 1966). The level of work experience is another critical factor when students have to assess the relevance of information and what information is crucial (Chi & Glaser, 1985); work-experienced students claimed that they could exclude the analytic steps of the assessment based on their work experiences (Gulikers et al., 2008). These results are supported by Billett (2015), who substantiate that students' previous knowledge is of vital importance in developing their readiness to participate in higher education and in practice-based learning opportunities.

The current study extends the results of previous research (Billett, 2015; Govaerts et al., 2005; Gulikers et al., 2004; Gulikers et al., 2008). We found that work-experienced students participating in higher education may not use theories to guide their analyses of work in favour of authentic practical problem-solving. The idea of professional development by participating in higher education may then fail since the students, as found by Handal and Hofgaard Lycke (2005), do not change their perception of professional practice during their studies.

As noted in the previous study, the students replaced theories they regarded as bookish with their practical knowledge of similar cases when asked to analyse management theories. In the current study, the same students seemed to have overlooked the difference in the degree of codification (operationalisation) of theories, which reduced the potential of the theory to be used as an analytical tool to analyse the authentic case. The current study provides

an explanation for this unintended and unexpected outcome of practice-based learning. While the difficulties for novices emanate from their understanding of the studied objects, the difficulties for work-experienced students in the current study emanate from their understanding of theory. Work-experienced students have a tendency to neglect theory as an analytical tool, but only in cases where the students' perception determines the theory to be bookish. That is, their already existing knowing will be regarded as being more helpful, thus preventing new knowledge from developing into new knowing. These results support and complement the findings of the previous study by Liff and Rovio-Johansson (2014), in which the understanding of theory was related to the way it was used, but without considering the importance of the degree of codification in the chosen theory.

It will be possible to use the findings of this study in undergraduate and postgraduate teaching in social and behavioural sciences. As indicated, textbook theories across disciplines have diverse degrees of codification (operationalisation). Results suggest that the degree of codification associated with a theory affects how students use that theory. Accordingly, findings of this study could be applied to other disciplines in higher education.

Practical implications, limitations and future research

The first practical implication is that teachers can demonstrate to students the use of a highly codified theory and how the theory could be applied to real authentic work situations. The second practical implication is that self-study is insufficient to determine what should characterise the choice of a theory to be used as an analytical tool. Critical thinking needs to be developed. That is, teachers must provide students with explicit guidance about how to select theories under diverse contextual conditions. Results from the current study indicate that it is probably of particular importance when the work-experienced students have not attended higher education for many years.

This study brings certain clarity about the relative strength of the relationship between 1) understanding theory, choice of theory, and the learning outcomes (examination results), and 2) choice of theory and learning outcomes (examination results). Hence, the consequences of students selecting and using theory, and how important this is for their achievement of the learning outcomes need further investigation. This could be investigated by using examinations that offer the students the same degree of codified (operationalised) theories. If the differences between the examination results are less than in a study similar to the previous study, the choice of theory may be the most significant explanation for differences in examination results.

Whether that is a finding applicable to most disciplines in undergraduate and postgraduate studies should be investigated in future research.

Since the current study could be regarded as a pilot study for a methodology, it is possible to use larger groups of students in different disciplines in future research, to gain deeper knowledge about how students' understanding of theory affects the application and use of theory, i.e., if it is a direct or indirect effect via their choice of theory.

Conclusion

This study explains why work-experienced students may not change their perception of professional practice despite participating in practice-based learning in higher education. Findings of the current study suggest three main conclusions: 1) students' understanding of theory is crucial for selecting the adequate theory to explain a problem and applying the selected theory to solve the problem; 2) the degree of codification and operationalisation of selected theories influences the application of theory and thus examination results; and 3) understanding, choice, and application of theory are variables closely related to learning outcomes.

The knowing that work-experienced students bring into the course may mislead them to look for superficial similarities between their experiences and the theory, which lead them away from looking for highly codified theories in their choice of theories and to discard theory as bookish in the analysis phase. The choice of authentic cases may increase these types of difficulties, i.e., to give theory a chance to develop new knowing.

Accordingly, the current study extends previous research on work-experienced student learning and contributes to the international discussions on professional and practice-based learning opportunities offered to novices as well for students with work experience when they return to higher education studies (Govaerts et al., 2005; Gulikers et al., 2004; Gulikers et al., 2008; Handal & Hofgaard Lycke, 2005).

References

- Balconi, M., Pozzali, A. & Viale, R. (2007). The "Codification debate" revisited: A conceptual framework to analyse the role of tacit knowledge in economics. *Industrial and Corporate Change*, 16(5), 823-849. doi:10.1093/icc/dtm025
- Billett, S. (2012). Practice-Based Learning and professional education. In J. Higgs, R. Barnett, S. Billett, M. Hutchings, & F. Tarde (Eds.), *Practice-Based education: Perspectives and strategies* (pp. 101-112). Rotterdam, The Netherlands: Sense Publishers. doi:10.1007/978-94-6209-128-3_8

- Billett, S. (2014). Mediating learning at work: Personal mediations of social and brute facts. In C. Harteis, A. Rausch, & J. Seifried (Eds.), *Discourses on professional learning: On the boundary between learning and working* (pp. 75-93). Springer Science+Business Media Springer Dordrecht. doi:10.1007/978-94-007-7012-6_5
- Billett, S. (2015). Personal epistemologies, readiness and learning. In S. Billett (Ed.), *Integrating practice-based experiences in higher education* (pp. 225-251). Springer Science+Business Media Springer Dordrecht. doi:10.1016/j.edurev.2009.06.001
- Boud, D. (2012). Problematizing practice-based education. In J. Higgs, R. Barnett, S. Billett, M. Hutchings, & F. Tarde (Eds.), *Practice-Based education: Perspectives and strategies* (pp. 55-68). Rotterdam, The Netherlands: Sense Publishers. doi:10.1007/978-94-6209-128-3_5
- Cheng, E. W. L. (2016). Learning through Variation Theory: A case study. *International Journal of Teaching and Learning in Higher Education*, 28(2), 283-292.
- Chi, M. T. H., & Glaser, R. (1985). Problem solving ability. In R. Sternberg (Ed.), *Human abilities: An information processing approach* (pp. 227-250). New York, NY: Freeman.
- Czarniawska, B. (1997). *Narrating the organization. Dramas of identity*. Chicago, IL: Chicago University Press.
- Davenport, T. & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Cambridge, MA: Harvard University Press. doi:10.1145/348772.348775
- Evans, K. & Guile, D. (2012). Putting different forms of knowledge to work in practice. In J. Higgs, R. Barnett, S. Billett, M. Hutchings, & F. Tarde (Eds.), *Practice-Based education: Perspectives and strategies* (pp. 113-130). New York, NY: Sense Publishers. doi:10.1007/978-94-6209-128-3_9
- Gherardi, S. (2016). To start practice theorizing anew: The contribution of the concepts of *agencement* and formativeness. *Organization*, 23(5), 680-698. doi:10.1177/1350508415605174
- Gherardi, S. & Miele, F. (2018). Knowledge management from a social perspective: The contribution of practice-based studies. In J. Syed, P. Murray, D. Hislop, & Y. Mouzoughi (Eds.), *The Palgrave handbook of knowledge management* (pp. 151-176). London, UK: Palgrave Macmillan. doi:10.1007/978-3-319-71434-9_7
- Govaerts, M. J. B., van der Vleuten, C. P. M., Schuwirth, L. W. T. & Muijtjens, A. M. M. (2005). The use of observational diaries in in-training evaluation: Student perceptions. *Advances in Health Sciences Education*, 10(3), 171-188. doi:10.1007/s10459-005-0398-5
- Gulikers, J. T. M., Bastiaens, Th. J., & Kirschner, P. A. (2004). A five-dimensional framework for authentic assessment. *Educational Technology Research and Development*, 52(3), 67-85. doi:10.1007/BF02504676
- Gulikers, J. T. M., Kester, L., Kirschner, P. A. & Bastiaens, Th. J. (2008). The effect of practical experiences on perceptions of assessment authenticity, study approach, and learning outcomes. *Learning and Instruction*, 18(2), 172-186. doi:10.1016/j.learninstruc.2407.02.012
- Guzman, G. & Trivelato, L. F. (2011). Packaging and unpacking knowledge in mass higher education – a knowledge management perspective. *Higher Education*, 62(4), 451-465. doi:10.1007/s10734-010-9398-3
- Handal, G. & Hofgaard Lycke, K. (2005). *From higher education to professional practice: Learning among students and novice professionals*. Paper presented at the Conference of European Association of Research on Learning and Instruction (EARLI), University of Nicosia, 23-27 August 2005, Cyprus.
- Higgs, J. (2012). Practice-based education pedagogy. Situated, capability-development, relationship practices. In J. Higgs, R. Barnett, S. Billett, M. Hutchings, & F. Tarde (Eds.), *Practice-Based education: Perspectives and strategies* (pp. 71-80). New York, NY: Sense Publishers. doi:10.1007/978-94-6209-128-3_6
- Hislop, D. (2005). *Knowledge management in organizations*. Oxford, England: Oxford University Press.
- Jacobsen, D. I. & Thorsvik, J. (2002). *Hur moderna organisationer fungerar* [How modern organizations work]. Lund, Sweden: Studentlitteratur.
- Lazaric, N., Mangolte, P.A. & Massue, M. L. (2003). Articulation and codification of collective know-how in steel industry: Evidence from blast furnace control in France. *Research Policy*, 32(10), 1829-1847. doi:10.1016/S0048-7333(03)00066-0.
- Liff, R. & Rovio-Johansson, A. (2014). Students' understanding of theory in undergraduate education. *Teaching in Higher Education*, 19(4), 419-431. doi:10.1080/13562517.2014.880678
- March, J. G. (2010). *The ambiguities of experience*. Ithaca, NY: Cornell University Press.
- Marton, F. (2015). *Necessary Conditions of Learning*. Oxfordshire, England: Routledge.
- Nightingale, P. (2003). 'If Nelson and Winter are only half right about tacit knowledge, which half? A Searlean critique of "codification"'. *Industrial and Corporate Change*, 12(2), 149-183. doi:10.1093/icc/12.2.147

- Raelin, J. (2008). *Work-based learning – Bridging knowledge and action in the workplace*. San Francisco, CA: Josey-Bass.
- Revans, R.W. (1966). *The theory of practice in management*. London, England: Macdonald & Co. Ltd.
- Rovio-Johansson, A. (2016). Students' knowledge progression: Sustainable learning in higher education. *International Journal of Teaching and Learning in Higher Education*, 29(3), 427-439.
- Schatzki, T. R., Knorr Cetina, K. & Von Savigny, E. (Eds.). (2001). *The practice turn in contemporary theory*. Oxfordshire, UK: Routledge.
- Siverbo, S. (Ed.). (2007). *Demokratisk och effektiv styrning. En antologi om forskning i offentlig förvaltning*. [Democratic and effective control. An anthology of research in public management]. Lund, Sweden: Studentlitteratur.
- Tight, M. (Ed.). (2009). *The Routledge international handbook of higher education*. Oxfordshire, UK: Routledge.
- Wrenn, J. & Wrenn, B. (2009). Enhancing learning by integrating theory and practice. *International Journal of Teaching and Learning in Higher Education*, 21(2), 258-265.
- Zollo, M. & Winter, S. (2002). Deliberate learning and the evolution of dynamic capabilities. *Organization Science*, 13(3), 339–352. doi:10-1087/orsc.13.3.339.2780
- Zollo, M. (1998). *Knowledge codification, process routinization and the development of organizational capabilities: Post-acquisition integration in the U.S. banking industry* (Unpublished doctoral dissertation). University of Pennsylvania, Philadelphia, PA.

AIRI ROVIO-JOHANSSON is Professor of Educational Sciences and Senior Research Fellow at Gothenburg Research Institute at the University of Gothenburg, Sweden. She is an experienced researcher, teacher and supervisor in higher education. Her main research domains are teaching, students' sustainable learning, institutional discourse analysis, and organising change processes in public and private organisations. She is an experienced expert assessor of auditing and

accreditation of quality assurance of universities in Europe. Her publications include books, book chapters and journal articles in, e.g., *Teaching in Higher Education*, *Applied Research in Higher Education*, *Journal of Workplace Learning*, *Journal of Documentation*, *Women and Health*.

ROY LIFF is Professor of Business Administration and Senior Research Fellow at Gothenburg Research Institute at the University of Gothenburg, Sweden. Previously, he acted for many years as an experienced management consultant in public and private organisations. His main research areas are public management, risk management, age management, multi-professional teamwork and teaching in higher education. He is an experienced teacher and researcher of novice students' and work experienced students' learning in recurrent education at higher education level. He has published articles for instance in, *Teaching in Higher Education*, *Public Management Review*, *Journal of Professions and Organization*, *Journal of Knowledge Management*.

GUSTAVO GUZMAN is Senior Lecturer in the School of Business, Griffith University, Australia. His teaching experience includes delivering management courses at both graduate and post-graduate level to culturally diverse learners. His research interests include knowledge, practice, knowing as well as the sociology of organising. This knowledge is applied to higher education, health management, supply chain management and project management disciplines. He is currently editing a book on the relations between space and organising. His articles has been published in *Higher Education*, *Journal of Knowledge Management*, *The Learning Organization*, *The Journal of Workplace Learning*, *Environment and Planning A: Economy & Space*.

Acknowledgements

We gratefully thank the two anonymous reviewers and the editor for their constructive and guiding comments in preparing this paper.