

DRAWING THE BOUNDARIES OF CODIFIED KNOWLEDGE TRANSFER

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ABSTRACT

The goal of this paper is to examine an instance of the codified knowledge transfer process in non-routine activities from the socio-organizational perspective. We examined knowledge codification, decodification and mechanisms to transfer knowledge considering two aspects: the role of context and the portion of tacit knowledge embedded in codified knowledge. The empirical evidence came from a higher education institution that used ‘course guidelines’ (codified knowledge) as part of its mass-education strategy. Findings indicated that different assumptions key stakeholders had regarding the nature of knowledge, the role of context, the portion of tacit elements contained in CK, and the codification decodification activities helped to explain the codification process. Moreover, the codification process was part of a wider process of commodification that attempted to create a knowledge product plausible of storage and distribution. This is a new form of organizing knowledge that involves dividing, codifying and replicating knowledge by third parties. The paradox of this situation is that, while the codification strategy implies in the separation of the processes of codification and decodification, the adequate decodification process needs integration between those two processes.

1 INTRODUCTION

Karl Popper’s ideas of objective knowledge seem to be taken very seriously in some academic circles. As a result, some (e.g. Marr and Chatzkel, 2004) have devoted significant efforts to measure the economic value of knowledge. Others (e.g. Alavi and Tiwana, 2005), have consistently supported the development IT-based ‘solutions’ to ‘manage’ knowledge. Similarly, the managerial practitioner-oriented literature (Davenport & Prusak, 1998; Ruggles, 1997), has been developing conceptual models and tools to facilitate knowledge creation, sharing, storage, and distribution. All of the above views assumed, *à la* Popper, that knowledge can be explicated, codified, stored, (de)codified and understood without problems. Because of this, the transfer of codified knowledge is one of the most taken-for-granted aspects in the knowledge management literature.

The transfer of Codified Knowledge (CK), nevertheless, seems to be more complex than appears at first sight. Firstly, there is no such thing as ‘pure’ codified knowledge. Knowledge has both codified and tacit components (Nightingale, 2003; Polanyi, 1983). Secondly, the tacit portion of knowledge might be difficult or not possible to codify, store

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and transfer, since interpretation, cognition, multiple meanings, as well as trust, politics, and emotions are crucial to its understanding (Bapuji & Crossan, 2005; Inkpen & Tsang, 2005; Orlikowski, 2002; Nicolini, Gherardi & Yanow, 2003; Tsoukas, 2005). This means that it is necessary to re-think the transfer of codified knowledge process.

The aim of this study is to contribute to the further understanding of three processes directly connected with the transfer of codified knowledge: knowledge codification, mechanism used to transfer knowledge and knowledge decodification. This examination is developed considering two aspects that have been neglected by the literature. The first is type CK. While empirical studies have rightly addressed, for example, Knowledge Transfer (KT) mechanisms (e.g. Prencipe and Tell, 2001) or implementation stages (e.g. Szulanski, 2000), those studies have not considered the tacit components of CK. Our framework will consider two extremes types of CK: one that needs a low portion of tacit knowledge and the other that needs a high portion of tacit knowledge. The second aspect is context, since it plays a crucial role in the processes of knowledge codification and decodification (Lave and Wenger, 1991).

The empirical component of the study was developed at a higher education institution that followed a ‘codification strategy’ (Hansen, Nohria and Tierney, 1999). That is, ‘course guidelines’ were used as the main mechanism to transfer CK about course content, assessment, and teaching delivery strategies by expert professors, who developed course guidelines to teaching instructors who needed to understand course guidelines in order to plan and deliver course content. That is, a highly experienced professor designs and develops a course outline (codification of knowledge). On the other hand, a course instructor develops an understanding, based on the course outline, of how to apply specific theories, concepts, case studies, and exercises in order to deliver that knowledge to students (knowledge decodification).

It should be noted that this paper is not about transferring knowledge between instructors and students in the conventional sense. It also does not aim to discuss the well known (in the Education field) structuration approach, but to examine the design and application of course guidelines as the critical means to ‘transfer’ knowledge. Thus, rather than examining this process according to a conventional education perspective, we analyze it from a knowledge transfer perspective. This means that building on current education literature and applying knowledge transfer theories would bring a better appreciation of the processes surrounding the transfer of codified knowledge.

In the next section, we outline key education and management concepts that will frame the examination of the empirical evidence. Subsequently, methodological aspects and the research setting are described. In the last three sections, the research findings are outlined and discussed and conclusions drawn.

2 CODIFIED KNOWLEDGE TRANSFER: EDUCATION AND MANAGEMENT INTERFACES

Two bodies of knowledge are blended in order to frame our empirical investigation. Firstly, the education literature, since it assumes that learning involves knowledge transfer (McKeachie, 1987; Alexander & Murphy, 1999). From this viewpoint, we discuss the structuration and constructivist perspectives. Secondly, we outline key concepts and

theories of codified knowledge transfer. Finally, we blend the two previous theoretical strands in order to build an analytical framework that will guide the empirical component of this paper.

The education literature has two sharply differentiated approaches: the structured and the constructivist learning approaches. Structured learning refers to the use of materials, such as textbooks, that detail comprehensive teaching content and procedures. Today textbooks are widely used in education (Castro, 2000). Reviewing the education literature, Tennant (2001) noted that, on the one hand, earlier cognitive psychology literature has focussed on uncovering the conditions that facilitate individual learning and the role of domain-specific knowledge in problem-solving activities (e.g. Glaser, 1987). However, empirical research has focussed on de-contextualized problems and on school and work learning environments only. On the other hand, contemporary cognitive psychology, attempting to address some of the limitations of the earlier approaches, has incorporated contextual issues within their analyses. Within the psychological tradition, however, “the very notion of transfer rests upon a conceptual separation of learning and the contexts to which the learning may be applied” (Tennant, 2001: 169).

Conversely, the constructivist approach suggests that, rather than learned, knowledge is constructed through social interaction in a specific socio-cultural context. It encompasses interpretation and adaptation of personal schemata to environmental stimuli. It is based on the individual’s previous personal experience, knowledge, and epistemology (Lynch, Leo and Downing, 2006; Pea, 1987). The situated learning approach (Lave and Wenger, 1991) can be categorized within this view. It stresses the central role played by the context and focuses on how individuals learn in communities of practitioners. It involves not only learning specific cognitive and practical activities, but also acquiring social and political understanding of the environment. Thus, meaningful learning only takes place if it is embedded in the social and physical context in which it is used (Brown and Duguid, 2001). McLellan (1994) noted that well-known pedagogical approaches, such as apprenticeship, collaboration, coaching, and action learning, have incorporated some of the key components of the situated learning model.

In the **management literature**, in spite of the recognition of the codified and tacit elements of knowledge (Polanyi, 1983), contemporary research usually treats knowledge as having a significant proportion of either codified components, which overlook its tacit elements, or tacit components, which ignore codified components (Empson, 2001; Hazlett, McAdam and Gallagher, 2005). The implication is that the group that approaches CK as an objective entity will tend to follow codification strategies. The group that approaches CK as having tacit components will tend to consider social aspects entrenched in the codification process in order to understand its associated subtle processes of abstraction (Lillrank 1995), translation (Czarniawska and Joerges, 1996), and transformation, recognizing that that part of tacit knowledge is uncodifiable.

Now we turn our attention to three key processes of the CKT: knowledge codification, mechanisms used to transfer knowledge, and knowledge decodification.

Firstly, knowledge codification is the extent to which accumulated experience can be abstracted into manuals to provide know-what, know-how, and know-why for the execution of tasks (Zollo, 1998: 26). The process of codification of knowledge, however, is not

without problems. In the first place, CK might contain tacit elements that remain uncoded (Ancori et al., 2000; Cowan, David, & Foray, 2000; Roberts, 2000) and in the second place, the extent to which knowledge is ‘codifiable’ is debatable (Johnson, Lorentz and Lundvall, 2002; Zack, 1999). On the one hand, Cowan (2001) and Cowan et al. (2000) point out that the codification process is more linked to technical and economic aspects than to tacit features of knowledge. On the other hand, Ancori et al. (2000) and Johnson et al. (2002) suggest that it is not possible to codify the tacit components of knowledge.

Secondly, empirical-based studies (Grimaldi and Torrissi, 2001; Olivera, 2000; Prencipe and Tell, 2001) have identified numerous mechanisms to transfer (or learn) knowledge. Nevertheless, the application of those mechanisms cannot be generalized, since these studies focussed on different stages of KM and types of knowledge. That is, it is not possible to generalize what mechanism is adequate for what situation.

Thirdly, knowledge decodification encompasses interpretation and translation (Czarniawska and Joerges, 1996) that in turn involves knowing the meaning of the codes used by the sender as well as the underlying knowledge necessary to interpret the use of those codes (Hall, 2006:18). This means that both knowledge-related (e.g. cognition) and non-knowledge related (e.g. trust) aspects need to be considered during both codification and decodification (Guzman and Wilson, 2005). Considering these aspects, in the next paragraphs we critically review contemporary knowledge transfer theories.

Knowledge transfer theories

The literature on KT can be divided in two groups. The first group has focussed on the understanding of specific topics related to the KT process. They have agreed on aspects that shape KT processes, such as task and context similarity (Dixon, 2000), characteristics of the sender–receiver social relationship (Hansen et al., 1999), technology features (Argote and Darr, 2002), degree of knowledge ambiguity (Simonin, 1999), type of organizational control used (Turner and Makhija, 2006), and properties of knowledge (Argote, McEvily and Reagans, 2003). The second group has developed theories to promote KT. While earlier theories focussed on disciplines (Senge, 1990) and core activities (Leonard-Barton, 1998), contemporary research focussed on processes and means, such as the ‘reservoirs’ of knowledge theory (Argote and Ingram, 2000). Szulanski’s (1996, 2000) four-stage implementation of organizational routines study complements the reservoirs theory since it focussed on a key aspect that the previous literature had overlooked, the implementation dimension.

The above theoretical and empirical studies have contributed to the understanding of the Codified Knowledge Transfer (CKT) process. However, they have treated CK generically without reflecting on the fine texture of different types of CK, which might possess a higher or lower proportion of tacit components. The reservoirs of knowledge theory (Argote and Ingram, 2000), for example, does not address the connection between the different types of knowledge and mechanisms used to transfer knowledge. Secondly, there is a void in respect to the tacit portion of knowledge that is not possible to codify. Current research on tacit knowledge (e.g. Lave and Wenger, 1991; Nicolini et al., 2003), has not considered by the reservoirs theory. Thirdly, there seems to be a bias towards the ‘knowledge codification’ (Hansen et al., 1999) strategy. There is evidence of its successful application in mass-production organizations (e.g. Argote and Darr, (2002) but there is little evidence of its application in organizations dealing with more complex and heterogeneous tasks.

Figure 1 graphically illustrates our approach. This framework enables an examination of the CKT process considering different types and contexts of CK encompassing knowledge codification, means of KT and knowledge decodification. Contrasting different situations supports theory building (Eisenhardt, 1989). It must be noted that, while we are focussing on two aspects of the KT process, we acknowledge the existence of other issues that shape the KT processes, such as artefacts, interpretation, political environment, and cognition.

CKT PROCESS TYPE OF CK Context	Low portion of tacit components		High portion of tacit components	
	From HEI to U-one	From HEI to U-two	From HEI to U-one	From HEI to U-two
CODIFICATION <ul style="list-style-type: none"> Assumptions regarding nature of Knowledge Assumptions regarding end-users Assumptions regarding end-users' context 				
KT MECHANISMS <ul style="list-style-type: none"> People-based mechanisms Technology-based mechanism 				
DECODIFICATION <ul style="list-style-type: none"> Assumptions regarding nature of knowledge Assumptions regarding end-user experience Assumptions regarding end-user context Relation with sender 				

Figure 1: The Analytical Framework

Considering the education and the knowledge and learning literatures simultaneously, it is suggested that, on the one hand, the structuration approach deals with some elements of the codification stage but does not incorporate transfer and decodification aspects into the understanding of the transfer process. On the other hand, the constructivist approach has several elements in common with contemporary knowledge and learning theories. The most notable is that both approaches are based on Lave and Wenger's (1991) situated learning theory. The problem arises when those approaches are viewed as competing. This can be addressed if we adopt the view that codified and tacit components of knowledge are

complementary rather than substitutes (Nightingale, 2003). Finally, and following Schultze and Stabell (2004: 205), we see those categories as dualities, useful to examine contradictions since opposing ideas are examined simultaneously. This is the theoretical line that we will follow in the examination of the empirical investigation. Before this examination, we now outline the methodological strategy.

3 METHODOLOGY

Case study methodology (Yin, 1981) was used. It is not only a recognized qualitative research method, but also supports the deep understanding of contextual conditions surrounding knowledge codification, transfer, and decodification processes (Bryman and Bell, 2003), including the complex socio-political and interpretive issues (Burrell and Morgan, 1979) that permeate KT related processes. This is important since one of the key assumptions in this study is that all codified knowledge possesses tacit components.

Methods of data collection involved in-depth, non-structured interviews, direct observation, and document examination. Six course instructors, three expert professors, three course coordinators, three guideline planners, ten students, two Heads of associated units and the HEI's Dean of Studies were interviewed. Because one member of the research team was working as course coordinator and course instructor during the time of research, interviews were both formal and informal. This avoided some of the well-known problems of interviews (Fontana and Frey, 1998). Interviews occurred between September 2004 and September 2005, were recorded, and generated more than 10 hours of recording plus an additional 30 handwritten pages. The use of multiple data collection methods and the feedback of interviewees concerning data collected enabled triangulation, a key aspect that supported validation. Multiple case studies were developed, at the headquarters, and in two associated units (see details below).

4 THE RESEARCH SETTING

The empirical component of the study was developed at a higher education institution ('HEI') that operates under a franchise model. While the academic content of courses is centrally determined by HEI, local units have significant autonomy to manage operational procedures. HEI applies a 'structuration' approach to achieve its strategic goal of geographical expansion and growth. In order to assure the delivery of consistent course content, HEI 'packaged' knowledge into course guidelines (CG). According to HEI, CG must provide course instructors with both theoretical and practical knowledge about course content, examples, case studies, teamwork activities, and didactical tips. HEI temporarily contracted 'expert' professors to design CG.

HEI operates its own units and has franchisees (associated units) that are distributed around the country. Whilst HEI is relatively new in the higher education sector (opened in 2001), it has 40 years experience in the school sector, with 270 associated schools and 110,000 students. As at March 2007, HEI had 9,000 students, 450 staff, including 320 course instructors, and operates eight units, three owned by HEI and five associated units.

In order to examine the influence of type of CK on the CKT process, we focussed on two very different courses of the Production Engineering undergraduate degree, one

quantitative (calculus), that represents CK with a low portion of tacit knowledge, and the other qualitative (organizational theory), that represents CK with a high portion of tacit knowledge.

Likewise, in order to examine the influence of the context on the process of CKT, we have focussed on two units. One (‘U-one’) owned by HEI, possesses good infrastructure and is located 30 km away from the capital city where the HEI is located. This means that it is not difficult to hire course instructors with the relevant professional and academic profile. At U-one, 77% of course instructors had postgraduate qualifications and 62% more than two years of professional experience. The other (‘U-two’), an associate unit, is located in a relatively small tourist city, 630 km away from the capital city and with little industrial activity. Thus, it is very difficult to hire course instructors with the required academic qualifications. At U-two, only 32 % of course instructors had postgraduate qualifications and 79% had more than two years of professional experience.

The formal role of the course instructors is to assimilate the academic and teaching advice codified in the CG, adapt it to the local conditions of operation, and deliver the lectures. Because HEI is a ‘teaching’ university, its policy is to hire only course instructors with postgraduate qualifications. This is related to HEI’s mass-education strategy to deliver standard course content with consistent quality and at a competitive price. In theory, HEI aims to match professional experience profile of the instructor with the course to be delivered. In reality, as we will explain in the findings section, this does not happen in the associated units located far from large cities.

Expert professors were hired to develop CG only. They had the academic requirements (PhD and research experience in the area) to develop CG. However, in the majority of cases, they were not aware of the specific profile of students, instructors’ academic and professional background, availability of suggested materials (e.g. textbooks), and, most importantly, the contextual conditions of the units.

5 RESEARCH FINDINGS

The empirical evidence suggests that the codification strategy has limitations that are connected with the different assumptions of key stakeholders regarding the codification process, the nature and role of knowledge transfer mechanisms, and the decodification process and the role of the context. These four aspects are detailed next.

Assumptions regarding the nature of knowledge and the codification process

HEI’s top management, expert professors (knowledge codifiers), and course instructors (knowledge decoders) had different assumptions regarding both the nature of academic knowledge and the codification process. On the one hand, HEI’s top management strongly believed that all academic knowledge can be codified; they treated knowledge as an undifferentiated product, ignoring the difference between courses that require more and courses that require less tacit knowledge in order to be codified, and therefore consciously pursued a ‘codification’ strategy. HEI’s top management was convinced that structure-based mechanisms based on knowledge codification (CG) were enough to enable the transfer of academic knowledge from HEI to associated units.

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The course guidelines are passed to the newly hired teachers [course instructors] the day they are contracted. This helps them to prepare their teaching [HR manager]

The above is partly explained by HEI’s background. As owners of a large group managing independent schools, they just continued applying the same mass education strategy that they had successfully applied for the last 40 years. Secondly, from a financial and organizational perspective, it was more convenient for HEI to adopt a codified knowledge position across all courses than to organize a more painstaking process that considers courses containing differentiated portions of tacit elements. The latter might have been implied in higher costs since additional coordination would be necessary to facilitate CG adaptation to local units.

On the other hand, expert professors (knowledge codifiers) knew that it would not be possible to write down all their knowledge and experience related to a specific course. That is, they were aware that CG adaptation to the local conditions of operation was necessary. They even imagined that they would be called back to improve CG in the future. The temporal nature of their relationship with HEI, however, prevented this. This behavior of experts is common in codification processes (e.g. Morris, 2001).

I try to write in the guidelines [CG] the best advice ... but sometimes I am not sure if the reader will use the textbook in the way I am indicating [Expert Professor 3]

Course instructors shared a similar view to expert professors. They were aware that additional tacit professional and teaching experience was necessary in order to know how to apply knowledge contained in the CG. The quote below illustrates this point.

The guidelines [CG] are important since [it] indicates textbooks available in the library and describe examples. [However] I do have my own additional material and [I] always end changing guidelines instructions [Course Instructor 3].

It must be noted that the codification of academic and teaching knowledge into CG constituted the cornerstone of the HEI strategy to expand its operations. As franchisee, HEI’s main product was composed of a group of courses and associated organizational and managerial routines established to set up and run the academic and operational portion of the business. Courses came in the form of course outlines. According to HEI’s top management, CG ensures consistency of the course content and, at the same time, allows them to be competitive in price terms.

The lesson number one is the ‘packaging’ of teaching ... the adopted solution [course guidelines] seems to be adequate given our two main challenges. The accelerated expansion of enrollments and the opening of new units. That is, the goal is to grow without problems of having to replicate our teaching quality standards. [Academic Dean]

In order to achieve consistency, HEI standardized the delivery of the course in terms of content breadth and depth. That is, the same course, with the same format and content, needs to be delivered in the same number of weeks using the same textbooks and didactical supporting material. The quote below illustrates this.

The course guidelines must be always developed using the same template, using the same textbooks and page numbers. We cannot have two templates. They need to be identical. [Project manager, Course Guidelines project]

The above suggests that the difficulties of promoting CKT seem to be more linked with the assumptions held about knowledge of the individuals involved than with the very process of transferring CK. Although expert professors and course instructors were aware of the impossibility of codifying all academic and teaching knowledge into CG, HEI did not organize additional support in the decodification process because it believed it was not necessary.

Assumptions regarding KT mechanisms

Structure-based mechanisms (CG) were the only mechanisms officially recognized and promoted by HEI to transfer knowledge.

The idea [of the CG] is that somebody has already ‘broken his head’ detailing each lecture, with the best way to conduct each difficult step ... to discover the best possible example. This is what we call lecture structuration. We hand in these guidelines [CG] to the new teachers [course instructors]. This process assures a high quality lecture. [Course Coordinator 2]

Nevertheless, different actors had different assumptions regarding the nature and role of CG. On the one hand, expert professors, for example, saw CG as ‘guidelines only’ that needed to be improved and adapted to the contextual conditions of the local unit, as the following quote suggests.

After the teacher [course instructor] receives the guidelines [CG], it would be great if they contact me ... it could be a good idea to do a training or discussion session. [Expert Professor 2]

On the other hand, different uses were given to CG at different locations. At U-one, CG was approached in a more flexible manner, providing space for adaptations. By contrast, at U-two, CGs were perceived in a less flexible way, as the next two quotations reveal.

The main role of course guidelines is to support the teacher [course instructor] in the preparation of class activities. We do not have intention to ask that, for example, all suggested textbooks were used or yet that all suggested exercises were applied as planned in the course guidelines. [Course Coordinator, U-one].

... at a non structured course, outcomes are totally in the hands of teachers. At a structured course, there is a part that is in the hands of teachers [course instructors], but there is also a ‘back office’ that supports him [sic] ... from the general design of the course to suggestion of examples, exercises and case studies all is there ready to be used. [Academic Director, U-two].

Assumptions regarding the decodification process

HEI did not supported the decodification activities. HEI assumed that knowledge contained in CG would be understood and assimilated without problems by course instructors. To HEI, having course instructors with the required academic qualification and professional experience would be enough to efficiently deliver CG content.

I never had any contact with the responsible [author] of the course guideline. When there is a problem I talk with the course coordinator ... usually we arrive to a common interpretation of the guidelines. [Course Instructor 2]

The profile of our course instructors must combine academic knowledge with professional experience. In general, we look for teachers with postgraduate qualifications and five years industrial experience, in average. [Human Resources Manager]

However, HEI ignored the difficulty of finding instructors with the required academic qualifications in certain geographical areas, or realized this but transferred the issue to the local unit management. By contrast, course instructors made it clear that adaptation was absolutely necessary in order to make class activities worthwhile.

It is important to remember that guidelines [CG] only suggest materials to be used. There are things that need to be worked out by the teacher [course instructor]. Group activities are a good example. We need activities that can be marked otherwise students go away. Sometimes, guidelines [CG] indicate a reading, but how may I allocate marks for a reading activity? [Course Instructor 4]

Additionally, course instructors’ professional experience was key to contextualizing concepts from the CG and for creating their ‘own’ examples to illustrate subjective concepts.

Sometimes I use examples from our local industries. Here, for example, the mining industry is strong. It is where the students and I develop our professional activities ... talking about services, for example, it doesn’t make much sense. [Course Instructor 2]

Expert professors were unable to figure out the decodification process since course guidelines were developed before the actual units were set up and therefore the course instructors had not yet been hired. Because of this situation, they assumed that course instructors would have the adequate academic qualifications and, more importantly, the experience for the course they were to deliver. As we will see below, this was not the case and problems emerged.

The person [course instructor] who will use this material [CG] need to be familiar with this type of literature ... it is not everybody that uses these authors ... Accordingly the HEI, the majority of teachers [course instructors] are Master or Doctors [PhDs], this leaves me more at ease. [Expert Professor 2]

The Role of Context

HEI's top management assumed that the context between centrally located units and remotely located units was very similar in academic and technical infrastructure terms.

In general terms, our associate units have the same profile of our main campus. The infrastructure, organizational structure, course instructors' profile and the academic programs are all similar. [Academic Dean]

This, however, was not the case across the board. While in some units financial resources were adequate, in other units this was not the case. Moreover, in many cases, even with availability of financial resources, some academic resources were either not locally available (e.g. textbooks or qualified instructors) or they were inadequate (e.g. library and IT academic databases). Similar to HEI, expert professors, during the development of CG, did not consider the possibility of different contextual conditions for different units, as the quote below shows.

All faculties [units] are the same. Even the ones that are far away ... [if necessary] they must bring teachers [course instructors] from the capital city. [Expert Professor 1]

The role of type of CK

The extent to which CK contains (or needs) tacit components seems to influence both codification and decodification processes. On the one hand, qualitative courses such as organization theory has a high portion of tacit components because it is organizational knowledge. As such, it does not have clear boundaries, depends on people's interpretation, and only makes sense when it is applied to a specific situation (Tsoukas and Vladimirou, 2001; Spender, 1993). On the other hand, quantitative courses such as calculus possess a low portion of tacit knowledge, since content is fairly standardized and involves a set of mathematical based knowledge that can be represented by figures, there are few alternative ways to apply the formulae, and outcomes can be measured with precision. In Table 1 it is possible to observe that mathematical knowledge has a higher number of explicit elements than quantitative courses. This means that, in the case of calculus, both the codification and the decodification process were relatively well known, simple, and had few alternatives. Conversely, in the organizational theory course, a higher number of tacit elements was present. Therefore, both codification and decodification processes were complex and incomplete. The quotes below illustrate this point.

...in the case of calculus there are two basic textbooks ... they never change ... [I] always use the same material [textbooks]. The guidelines [CG] are good because there is practically nothing new ... it is the same thing I teach in other institutions. [Course Instructor 3]

... the problem with the Organizational Theory guidelines [CG] is that I do not know the majority of the suggested books ... I have never used some of that material and even, I know some of them are out-of-print. This means that I need to study the whole course again and, in many cases, I either do not understand or do not agree with the proposed discussion at the end I change the textbook or the topic, otherwise I feel uncomfortable. [Course Instructor 2]

Table 1 – The nature of mathematical and social science knowledge elements

Elements of Knowledge	Mathematical	Social Science
Propositions and statements (agreed)	Mainly explicit	Mainly explicit
Test and reasoning (applied to justify agreed statements)	Mainly explicit	Mainly tacit
Problems and puzzles (considered important to be solved)	Mainly explicit	Mainly tacit
Language and symbolism (used to enable mathematical communication)	Mainly tacit	Mainly tacit
Overarching vision: definition of standards, structure, and limitations of knowledge	Mainly tacit	Mainly tacit
Methods and procedures (applied to develop knowledge)	Mainly tacit	Both explicit and tacit

Source: Based on Ernest (1998).

Additional empirical evidence showing that tacit components of the qualitative course shaped both its codification and decodification process was obtained by studying the outcomes of students who transferred their courses from one course instructor to another. We observed that the percentage of failed students among the transferred students was 40% higher in organizational theory than in calculus. One explanation given by a student was that in organizational theory, “... look like teachers [course instructors] were lecturing different courses.”

6 DISCUSSION

Our empirical findings have confirmed some aspects of the codification process that have been noted by the literature, such as the belief that knowledge is made up mainly of codified components ignoring its tacit elements (e.g. Davenport and Prusak, 1998; Ruggles, 1997); the recognition that knowledge has both codified and tacit components (e.g. Polanyi, 1983); the understanding that, because of its tacit components, codified knowledge needs adaptation and transformation (e.g. Czarniawska and Joerges, 1996); and the use of local knowledge in order to adapt it (e.g. Brown and Duguid, 2001).

This study nevertheless has advanced a more nuanced understanding of the CKT process. We have highlighted how different assumptions regarding the nature of knowledge and the

nature of the whole process of knowledge codification by key stakeholders explain to a significant degree the limitations of the codification process. It must be clear, however, that even if there were no differences in assumptions, the process of knowledge codification and decodification would still be difficult, because codified knowledge contains tacit elements which are difficult, if not impossible, to codify, such as in the case of (practical) teaching knowledge. Further, the codification strategy is part of a larger ‘commodification’ strategy applied to make feasible HEI’s strategic growth and expansion plans. These themes are explored in the following paragraphs.

First, there is a lack of congruence of key assumptions (e.g. the nature of knowledge, the codification process, the nature of KT mechanisms, and the role of context) between HEI, knowledge codifiers (expert professors), and knowledge decoders (course instructors). Those different assumptions can be credited to political rationality and bounded rationality. Political rationality was applied by HEI when opting for the mass education strategy. This was not only a rational business strategy, but also a deliberate attempt to control educational services. This point is further explored in the discussion of the commodification strategy. Bounded rationality occurred, since in the early stages, HEI did not have associated units and therefore there were no course instructors. Expert professors had no information on how CG was to be applied, and course instructors were not informed about the roles of CG.

Second, any codification process needs decodification (Hall, 2006), and this must not be taken for granted since human resources, skills, and time are necessary in order to set up and implement adequate knowledge transfer mechanisms that help to bridge the codification and the decodification stages. The problem is that, to date, while a large number of mechanisms exist to support knowledge sharing (e.g. Davenport, De Long and Beers, 1998; Gupta and Govindarajan, 2000; Edmondson, 2003; Stenmark, 2001), their application is difficult since they are the outcome of empirical studies in different organizations, they are focussed in different stages of knowledge management, and emphasize different types of knowledge.

Third, the decodification process contains political aspects that must not be ignored. Newly hired course instructors were inhibited from raising their voices to ask for additional support for fear of appearing academically ‘weak’ among peers and with top management. Furthermore, course instructors were mostly part time, contracted temporarily, and were not unionized. Because their main job was in another organization, they did not perceive themselves as ‘teachers’ but as experienced professionals. All of these aspects restrained course instructors from asking for help during the decodification process. This means that political aspects are important in understanding the decodification process and should not be ignored (e.g. Contu and Willmott, 2003; Huzzard, 2004).

Four, CK might need tacit knowledge to different extents depending on the degree of similarity between the context in which knowledge is codified and the context in which knowledge is decodified. Our qualitative data suggests that the more similar the context (in terms of course instructors’ background and infrastructure), the less tacit knowledge is necessary, and vice versa. The problem is that it might be difficult to map the ‘degree of similarity’ of the context, since context is a complex concept that possesses both objective and subjective dimensions (Thompson and Walsham, 2004), and its understanding must not be taken for granted.

Five, CK needs tacit knowledge to differing degrees depending on the portion of tacit elements contained in the knowledge (specific course) to be transferred. As pointed out in the research findings section, qualitative courses have a higher portion of tacit elements than quantitative courses. This implies that, not only does the codification process of those courses need to be different, but also the amount of knowledge plausible to codify is different, and this brings implications for the decodification process and for the KT mechanisms used. Decodification in qualitative courses calls for differentiated resources and methods, since codified knowledge (textbooks) and semi-codified knowledge (lectures) will be unlikely to promote sharing of the tacit component. For example, similarity of the background of knowledge codifiers and knowledge decoders, as well as the amount of ‘coordination’ between knowledge codifiers and knowledge decoders, seem to be important. Similarly, because of the high number of tacit components contained in qualitative courses, knowledge transfer mechanisms that involve socialization, such as group discussion and case studies, seem to be necessary in order to cope with the tacit elements of the course. Conversely, in the case of quantitative courses, knowledge transfer mechanisms that use codified means, such as textbooks and course guidelines, seem to be adequate to support knowledge decodification and transfer. The above means that organizations need to consider the extent of tacit elements contained in codified knowledge (CG) in order to organize differentiated processes to support knowledge transfer and decodification.

Six, the amount of tacit knowledge embedded or necessary to both codify or decodify knowledge is another constraint to the CKT process. At HEI, course guidelines attempted to capture both academic knowledge and teaching processes and practices. While academic knowledge possessing a low need of tacit knowledge can be codified without many difficulties, the codification of teaching practices brings significant challenges since practice is tacit, situated, temporal, personal, and connected to prevalent local traditions (Polanyi, 1983, Nyiri, 1988, Orlikowski, 2002). This suggests that practice cannot be transferred, but only learned during action (Revans, 1966). In other words, the codification strategy applied by HEI is limited because it is unable to account for the practice-based component of knowledge. The fact that only 20% of CG contains examples to help course instructors to apply theoretical knowledge reinforces this point.

Seven, while the literature has posited that codification and decodification are two sides of the same process (Hall, 2006), organizations still continue to separate these activities since it is part of the mass production/consumption business model. Although there are well known economic benefits, the separation of knowledge creation from knowledge use cannot be taken for granted. There is a view (Wood, 2002) that suggests that it is not possible to separate knowledge production from knowledge use. There is also the problematic situation of experts disclosing their knowledge during the codification stage (e.g. Lazaric and Denis, 2001; Roberts, 2006). Here lies a contradiction of what we have called the new division of knowledge. On the one hand, attempting to re-integrate knowledge codification and knowledge decodification challenges the basic pillars of the mass education model. The very idea of the division of knowledge is that, by fractioning codification and decodification, not only will distribution (replication) costs be lower, but more importantly, its appropriation, storage, and marketing will become feasible. On the other hand, the non-integration of those elements might eventually cause its failure since their integration seems to be crucial for a ‘complete’ knowledge transfer. Moreover, this

new division of knowledge can also be perceived as a modern form of skill polarization, with its attached employment and industrial relations issues, such as the one that occurred with the introduction of automated manufacturing technology in the 1980s (see Wood, 1990). This means that the deployment of codification strategies must be inserted within the new division of knowledge debate and not as an isolated behavioral or organizational event in the pursuit of organizational efficiency.

Eight, HEI's 'codification strategy' converges with what Suddaby and Greenwood (2001) have called the 'commodification' of knowledge, that is, the idea of reducing knowledge to a routinized and codified product. Knowledge commodification was based on the appropriation, storage and distribution (sale) of a product (course). Appropriation occurred when expert professors articulated, codified, and formalized their knowledge in a written document (CG). After expert professors delivered the newly-developed CG, codified knowledge contained in the CG become the intellectual property of HEI. The CG, however, needed to follow a detailed template that was borrowed from a United States higher education institution. Under this template, teaching and academic knowledge is pasteurized in order to look professional, rational, and more particularly, of universal application and unproblematic. This process, as Heusinkveld and Benders (2005) found in knowledge-intensive professional firms, increases the products' marketability.

7 CONCLUSIONS

The aim of this study was to contribute to enhancing the understanding of the process of codified knowledge transfer. The theoretical framework integrated both education and knowledge and learning literatures. Rather than focussing on the micro psycho-cognitive processes that evolve during the codification or decodification processes, we have targeted the socio-organizational aspects that shape its main outcomes. Codified knowledge transfer was broadly defined as encompassing three interrelated processes: knowledge codification, use of a mechanism to transfer knowledge, and knowledge decodification. Cutting across these stages, two crucial dimensions were examined: context characteristics and the portion of tacit elements contained in codified knowledge. Specifically, we empirically examined one instance of the process of transfer of codified knowledge at a higher education institution: from knowledge codification (by expert professors) of both academic and teaching knowledge, to knowledge decodification by course instructors, using 'course outlines' as the sole mechanism to 'transfer' knowledge. The empirical findings have shown that the process of transfer of CK is not without problems.

On the one hand, it was pointed out that some aspects that shape the CKT process are linked to the different assumptions that key stakeholders have regarding the nature of knowledge, the supporting or constraining roles that contextual forces might take, and the extent to which CK contains higher or lower elements of tacit knowledge.

On the other hand, our evidence has also indicated that the application of 'codification strategies' is not only part of a larger mass-education policy, but also a deliberate attempt to 'commodify' (Suddaby and Greenwood, 2001) academic and teaching knowledge, that is, to ensure the appropriation of academic and teaching knowledge and the conversion of that knowledge into an objective product (course outlines) that can be stored and marketed. The commodification of knowledge, however, represents what we have called a new division of knowledge. This is a new form of organizing knowledge that involves dividing knowledge,

codifying it, and replicating it by third parties. The paradox of this situation is that, while knowledge codification entails the division of codifiers and decoders, in order to be effective, the CKT process needs the re-integration of codification and decodification activities. That is, because of the tacit elements of CK, there is a need to use social-based mechanisms that might support, but not assure, the assimilation, translation, and adaptation of codified knowledge by end-users. The latter, simultaneously, goes against the very idea of knowledge commodification. We argue that, unless this tension embedded in the commodification process is considered, ‘conventional’ codification efforts are likely to fail.

This study has contributed to the understanding of the CKT process since we have applied a systemic approach examining the three main phases of the codification process focussing on non-routine knowledge intensive activities. This is important, because the conventional research on CK has usually focussed on knowledge for routine activities that usually possess a low portion of tacit elements. Our study, by comparing CK containing a high and low portion of tacit elements in different contexts, has shed additional light on the CKT process. The usual strengths and weaknesses of case study research apply.

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