

The role of professional identity in patterns of use of multiple-choice assessment tools

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Abstract

This article uses the notion of professional identity within the framework of actor network theory to understand didactic practices within three faculties in an institution of Higher Education. The study is based on a series of interviews with lecturers in each faculty and diaries of their didactic practices. The article focuses on the use of a multiple-choice assessment tool available on a virtual learning environment and on the lecturers' attitudes towards it. The data suggests that the prevalent epistemic culture in a faculty's community of practice plays a significant role in the choices made by lecturers as far as their actual use of the tool is concerned. The lecturers' professional identity is also a substantial element in shaping their attitude towards the tool.

Keywords: professional identity, communities of practice, didactic practice, multiple-choice assessment, actor-network theory, virtual learning environments, higher education.

Introduction

In recent years, virtual learning environments (VLE) have been introduced in education, at all levels of the educational system. On the one hand, VLEs bring about some expectations of innovative pedagogical practice, and not only efficient organising of information and lecture notes. On the other hand, VLEs are presented as flexible tools that can easily be adapted to the teachers' own didactic aims. It is nevertheless relevant to investigate to what extent academics are in charge of the changes that arise from new practice with such artefacts.

One of the many instruments a VLE offers is a tool for creating multiple-choice assessments (MCA). This article discusses the use of such an online MCA tool in various educational settings. The discussion is based on a case study involving three different faculties at a Norwegian institution of Higher Education. A common denominator of the three faculties is that they all use the same VLE, a commercial piece of software that has been purchased and promoted by the central administration of the institution. We aim to describe the attitudes towards such a technology and the possible changes in their didactic practice with a particular focus on how this relates to their professional roles and identities.

The literature on professional identity in Higher Education is wide-ranging, but tends to focus on the professional identity of students (e.g. Jensen & Lahn, 2005; Reid, et al., 2008).

Among the works that focus on the professional identity of lecturers, the concepts of negotiation (Winberg, 2008), mediation (Henderson & Bradey, 2008), self-legitimation (Smeby, 2006), resistance and protection (Archer, 2008) seem to play a central role. Among those, works concerned more particularly with the role of educational technologies point towards a strong link between technology-supported pedagogical practices and the identity and beliefs of educators (Becker & Ravitz, 1999; Henderson & Bradey, 2008; Judson, 2006; Ravitz, et al., 2000), in particular the correlation between teachers' pedagogical beliefs and their preferences for socio-cultural practices with information and communication technology (Becker & Ravitz, 1999; Ravitz, et al., 2000). However, little is known about the role played by professional identity in the shaping of the technology-supported didactic practices of lecturers. This article proposes therefore to investigate further this link between didactic practices and professional identity, paying special attention to the role of multiple-choice assessment tools available within a VLE.

In this article, we aim to explore the role played by professional identity in the use or non-use of MCA tools within the realm of the didactic practices of lecturers. To that end, we wish to examine specific patterns of use of the MCA tools among academics and uncover their attitude towards such tools. We also seek to understand how this attitude relates to the pedagogical beliefs that are prevalent within their community of practice. We choose to try out actor network theory (ANT) as an analytical tool to achieve an understanding of the professional identity of academics in the context of technology use.

Exploring professional identity and technology use in didactic practices

In this section, we first present the concept of community of practice, and relate it to the notions of epistemic culture and professional identity. We then outline a number of criticisms of the model of community of practice, in particular the lack of attention paid to the notion of power. We highlight the relevance of such criticisms to the case of VLE use in Higher Education and propose actor network theory as a possible framework to approach the issue of technology use in didactic practices.

Etienne Wenger's major works on community of practice (Lave & Wenger, 1991; Wenger, 1998) bring to light the importance of the notion of identity in professional practice. The concepts of *participation* and *reification* are central to Wenger's understanding of the negotiation processes that create a sense of belonging within a community of practice. *Participation*, i.e. the process of taking part in a social enterprise and relating to other participants within this enterprise, is described by Wenger as an active process, which is "both personal and social" (Wenger, 1998, p. 56). *Reification* ordinarily means "making into a material thing". However, the concept is used by Wenger in a broader sense, and refers to "the process of giving form to our experience by producing objects that congeal this experience into 'thingness'" (1998, p. 58). It covers "a wide range of processes that include making, designing, representing, naming, encoding, and describing, as well as perceiving, interpreting, using, reusing, decoding, and recasting" (1998, p. 59).

A key concept in Wenger's writing is *identity*, which is described as 1) a negotiated experience of the self, 2) a membership in a community, 3) a mode of integration of past and

future meanings into the present (a process referred to as trajectory), 4) the nexus of multi-membership and 5) the interplay between local and global belonging (Wenger, 1998). The notion of identity rests heavily on the concepts of identification and negotiability. *Identification* refers to the creation and maintenance of bonds within a group and distinctions between groups, as for example in the case of a nationality-based sense of belonging. *Negotiability* refers to “the ability, facility and legitimacy to contribute to, take responsibility for, and shape the meanings that matter within a social configuration” (Wenger, 1998, p. 197). The notion of negotiability is thereby heavily reliant on the notion of *meaning*. Meanings are produced in different contexts, and different meanings will compete with each other to explain events, actions and artefacts. Those meanings therefore achieve different statuses and the asymmetry in terms of status contributes to what Wenger calls *economy of meaning*. Within those economies, the concept of *ownership of meaning* plays an important role: the negotiation of a meaning can bring about ownership of that meaning. Thus, the ability to successfully negotiate a meaning is a core dimension of “who we are” (1998, p. 201).

The notion of individual and group identity is also a recurrent theme in the literature within the field of sociology of science and technology. For example, Karin Knorr Cetina (1999) uses the notion of epistemic culture to elucidate knowledge-making processes enabled by instruments and machines, in particular technological artefacts. Epistemic cultures are presented as “those amalgams of arrangement and mechanisms... which, in a given field, make up *how we know what we know and what we know*. Epistemic cultures are cultures that create and warrant knowledge,...” (1999, p. 1) According to Knorr Cetina, a modern society can be characterised as an object-centred sociality, where for instance electronic artefacts as cell phones play an important role. The integration of knowledge objects may create communities “in thought” (Knorr Cetina, 1997, p. 24).

An example of the workings of epistemic cultures may be found in lecturers’ pedagogical philosophies and their preferences for certain teaching methods. We hereby present a typology that identifies several perspectives on learning, each of which is based on a different set of basic assumptions on what knowledge is and how it is acquired (Bruner, 1996; Greeno, 1997; Greeno, et al., 1996). The designation of those perspectives varies across the literature, but it is possible to identify a number of major streams.

One of those streams would include the associationist/behaviourist perspective, which views knowledge as a set of specific behavioural responses to specific stimuli. Learning consists therefore of acquiring the appropriate responses through repetition, facilitated by a programme of positive reinforcement (Skinner, 1989). Another stream would comprise the domain-structural or cognitive perspective, which considers learning to be about individual reasoning and understanding, as well as strategic problem solving (Piaget, 1970). A third stream would include perspectives referred to as socio-constructivist, socio-cultural, socio-historical, or situative. Those perspectives portray learning as a social and cultural process, and emphasise the role played by the community or communities the learner belongs to (Lave & Wenger, 1991; Vygotsky, 1978).

As outlined in Knorr Cetina’s work, technology represents a significant dimension in the mechanisms of knowledge creation. The use of artefacts is also a central element in our study, as

it is an inherent component of the teaching carried out within the community of practice of Higher Education. The use of technologies such as VLEs brings in new ways of working that are partly influenced by norms and values that have been implemented in the system. Power issues related to the use of technology have been highlighted in the literature on Social Construction of Technology (SCOT), for example in the seminal work of Bijker, Hughes, & Pinch (1987), which underlines the role played by technology in the creation of social conflicts and their solutions. One example provided by Bijker et al. (1987) is that of the bicycle that was at the source of changing attitudes, for instance regarding the social acceptability of women's use of trousers. In that case, the artefact itself has become "stabilised" to the point where it allows new social behaviours. The artefact is thereby endowed with the power to change practices and social opinion.

Wenger's perspective has been criticised in a number of works such as Barton & Tusting (2005) and Hughes, Jewson, & Unwin (2007). Jewson (2007) offers an extensive overview of the criticisms that pervade the literature on communities of practice. His analysis suggests that the original works on communities of practice lack analytical mechanisms that could shed light on a series of important elements. Among those elements figure the processes of "disagreement, conflict and struggle, other than as tensions between newcomers and old-timers" (2007, p. 69) and processes of "exclusion, discrimination and oppression" (2007, p. 69). Such processes are tightly connected to "power differentials and struggles" (2007, p. 69). A similar concern that Wenger's perspective may not appropriately address the concept of power can be found in, e.g., Contu & Willmott (2003), Fox (2000) and Swan (2002).

It may, however, be noted that the concept of power is not absent from the conceptual models presented by Wenger (1998). In particular, the notions of alignment and identity are closely linked to power. Wenger's analysis also portrays power as present throughout the complex interplay between identification and negotiability: "... 'going along' – through willing allegiance or mere submission – is a form of identification because it shapes the way we experience our own power and thus contributes to defining our identity." (1998, p. 196)

Yet, in spite of the fact that the early community of practice literature recognises the existence of conflicts and power struggles, it has been suggested that it fails to provide "conceptual mechanisms for analysing and interpreting them" (Jewson, 2007, p. 71). Jewson also suggests that network analysis may be useful in bringing the notion of power to the front stage. He presents network analysis as focusing on "the configuration of interdependent relationships between members" (2007, p. 72) of a community and suggests that ANT is particularly appropriate to understand social network formation as a process rather than a reified or static state of affairs.

ANT as an analytical tool for investigating the mutual shaping of professional identity and technology

As it brings in the notion of non-human actors, ANT can be useful in understanding both their inherent power and the power asymmetries that emerge in their relationship with other actors (Akrich, 1992; Callon, 1986; Latour, 1987, 1988, 1999b). ANT offers a purposeful system of

concepts that allows for a description of professional identity as a process of negotiation and alignment between technological artefacts and social systems. It also helps to highlight how new epistemic cultures can grow out from such processes and how those cultures can change over time.

ANT has been described as one of the streams within the Social Science of Technology (Monteiro, 2000). One of the main characteristics of ANT is that it offers an alternative to the traditional dichotomy between society and technology. It provides a theoretical lens that aims to preserve the “hybrid” character of reality and proposes to look at technology and society not as separated domains, but as tightly intertwined entities (Latour, 1993).

Within ANT, both humans and non-humans may be bestowed the status of *actor* (also called *actant* in order to avoid the confusion with the traditional sociological meaning of the word actor). Actants can be defined very simply as “entities that *do* things” (Latour, 1992, p. 241) or entities that bring about action. Another definition of the word has been provided by Callon and Latour as “any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own” (1981, p. 286). This last definition introduces the concept of *network*. Actants are connected to each other through heterogeneous networks of aligned interest, i.e. all the actants in a network are more or less loosely contributing to action. Although ANT offers a large range of theoretical constructs that can be useful in the process of exploring the world of didactic practices, we choose to concentrate on three key concepts for the purpose of this paper: inscription, translation and blackboxing, as those concepts seem to be closely related to the processes that constitute professional identity.

The notion of *inscription* (Latour, 1992) refers to the action of embedding an actant, usually a technological artefact, with a particular purpose. Technological artefacts are usually intended for a particular type of usage, which results in designers “inscribing” them with a specific “pattern of action” (Latour, 1991). In other words, an artefact will typically be constructed in such a way that it will be clear for its users what its original purpose is and its intended use will be more or less strongly imposed on the users. For example, a hammer is a strongly inscribed artefact in that its use as a tool for pounding is clear to the user. Conversely, a wooden board has a low level of inscription, as it can be used for a large number of different purposes. Within this process of inscription, the designer of the artefact *aligns* the artefact with the rest of the network within which the artefact will play a role as enabler or facilitator of a particular activity that is necessary to the maintenance of the network (Latour, 1996).

However, it is well known that artefacts often end up being used in a very different way than originally intended by the designers. An example of this could be the use of a mobile phone as a flashlight. The process of taking an artefact intended for a purpose and employing it for a different purpose can be referred to as *translation* within an ANT framework (Monteiro, 2000). Throughout a translation process, users “*negotiate*” with artefacts and enrol them for their own interest, and thereby strengthen the network of aligned interests that is used to achieve their goals (Latour, 1996). The process of translating other actants plays therefore an important role in the building of power structures within an organisation.

The notion of *blackboxing* is closely linked to that of inscription (Latour, 1999a). Once an inscription is considered by actors in a network to be sufficiently stable, it is likely that it will be taken for granted, thereby creating a black box that actors do not question the content of, because they are only concerned with its input and output. An example of blackboxing can be found in the use of self-configuring laptop computers. Those computers are designed in such a way that configuration and, if necessary, reconfiguration do not require any technical knowledge. Users will therefore never need to “open the black box” if their computer encounters a technical problem. They will only need to reconfigure it, thereby recreating the original black box. This type of black box has been created so as to simplify the use of a very complex technology. However, there are situations whereby there is much to gain in opening a black box so as to examine and question its content, for example when the network ceases to function as expected. An example of opening the black box at the societal level could be the then revolutionary critical outlook on formula milk as the best alternative for infant nutrition in the 1970’s.

In brief, the concept of *non-human actors* (or actants) brings to light the role of technology as an inherent element of communities of practice. In particular, considering artefacts as actants, i.e. as entities that bring about changes among other actants, makes their role in shaping meanings within a community of practice more visible. Furthermore, the notion of *inscription* highlights the processes intrinsic to the design of technology that may have an influence on the didactic practice of academics. In the process of using technological tools that are more or less strongly inscribed, academics negotiate and translate those tools so as to have them fit within their didactic practices. The processes of negotiation and *translation* may be related to the epistemic culture and to professional identity. Finally, the notion of *blackboxing* may represent the embodiment of the strength of the professional identity that holds sway within a community of practice.

The notions presented above are all relevant to our quest about the role of pedagogical beliefs in MCA use. Pedagogical beliefs can be conceived of as a non-human actant which become inscribed in technological artefacts, such as the MCA. Pedagogical beliefs themselves can be seen as being inscribed in epistemic cultures within communities of practice. We seek to identify and describe those two levels of inscription in the study presented here. We also aim to uncover processes of translation of MCA as an artefact and situations whereby this artefact is black-boxed or where the black box is opened.

Methodology

This study is an investigation of the use of VLE-based multiple-choice assessment tools in a Norwegian institution of Higher Education. Three faculties – the Faculty of Nursing, the Faculty of Teacher Education and the Faculty of Engineering, were selected for the purpose of this study. The reason for choosing those faculties is that they appeared to represent very different professional identities and teaching traditions. Among the members of academic staff we interviewed to gather data about a wide range of aspects of their teaching practice, nine were singled out as main source of information on MCA use (four at the Faculty of Education, three at the Faculty of Engineering and two at the Faculty of Nursing). In this study, we focused on gathering information on modes of usage and attitudes toward a particular VLE, which was a commercial software acquired by the central management of the institution and made available

to all the employees. The study was based on actual use of and attitudes towards the standard VLE solution available throughout the institution.

The approach of this study is broadly interpretive, relying on ethnography-inspired methods (Fetterman, 1998). The study has been designed as an explorative case study, i.e. a detailed examination of a particular context for didactic practices (Yin, 1989). The unit of analysis for this study is didactic use of VLE technology. The strategy for selecting study participants is purposeful sampling (Miles & Huberman, 1994; Patton, 1990). The recruitment of participants was carried out both through the placing of an ad on the institutions webpage and via recommendations. Seven persons responded to the ad, among which the two interviewees from the Faculty of Nursing. Since no one from the Faculty of Engineering or the Faculty of Education responded to the ad, we resorted to contacting them directly. Among those who were approached directly, all accepted to participate in the study. The goal was to recruit participants that were academics involved in core teaching activities within their faculties and that were active VLE users to a greater or lesser extent.

The study was conducted longitudinally over time, the period varying between 2 and 12 months, depending on the availability of the interviewees. The empirical data that forms the basis of the case studies was collected primarily via face-to-face interviews (each lasting about one hour) and personal logs (diaries) kept by the participants, providing details of their VLE-based activities and their rationale. For each participant, data was gathered in three phases. In a first phase, the participant was interviewed without any particular preparation, so as to get hold of their thoughts and attitudes in an as spontaneous and candid a manner as possible. At the end of this interview, the participant was asked to keep a diary over a period of one week using a standard document, which constituted the second phase of the data gathering process. The third and last phase consisted of interviewing again the study participants, this time with a particular focus on the diary and the changes that had occurred since the first phase. They were typically asked to provide some more details about what they had written in the diary, and to describe changes in their didactic practices over time.

The interviews were all transcribed and coded with a computer-assisted qualitative data analysis software by both authors. To do so, we used a list of codes that we developed as the analysis went along. All the codes we used stemmed either from the original research question or from one or several core notions in ANT, in particular actant, inscription, translation and blackboxing. After the coding phase, we carried out searches on the basis of terms that we believed were most relevant to the research question. The extracts from interviews and from personal logs that were located through those searches formed the main basis of our findings.

Findings

The data from the case study reveals that both the attitude of the teaching staff towards online multiple-choice assessment tools and their actual practice vary greatly from one academic “milieu” to another. The study investigates more particularly the relation between staff attitude to multiple-choice tools and the underlying pedagogical philosophy permeating the community of practice they belong to.

Department 1: Faculty of Engineering

The field of engineering has been described as belonging to the science-based professions (Becher, 1989). Within this field, which “is concerned with ways of mastering the physical world” (1989, p. 15), there is traditionally little concern about discussing pedagogical philosophies. Rather, teaching methods for engineering courses are largely influenced by traditions that prevail within the various subject matters taught through those courses.

The data reveals that the respondents from the Faculty of Engineering consider both a cognitive and a socio-cultural learning philosophy to be legitimate approaches to learning. For example one of the interviewees asserts that the pedagogical approach of the Faculty is greatly dependent on the subject area: hard technical subjects that lend themselves to a cognitive approach on the one side and, on the other side, more social-oriented subjects for which a socio-cultural approach is more appropriate. This twofold approach makes the online multiple-choice tool a natural didactic practice when selecting a method to assess the students’ learning with regards to areas of knowledge where answers to questions can easily be categorized as “right” or “wrong”.

Some of the respondents from the faculty do express a certain scepticism towards the use of multiple-choice assessment. One reason given is that the topic they teach does not lend itself easily to a right answer/wrong answer categorisation.

Lecturer 1: But it is a question of principles. I am not a fan of those multiple-choice questions, and I call them... what is it called? Answer-dropping¹... that is, a method of elimination, like. (...) I am more a supporter of other types of assignments then, where they [the students] have to express themselves and think a bit.

Another reason given is that the wrong alternatives provided in the multiple-choice tests may become “engraved” in the students’ minds and can therefore act as a disruption in their cognitive processes.

On the whole, the members of the Faculty interviewed for this study are very aware of the algorithmic nature of the evaluation process in a multiple-choice test. This awareness translates both in a recognition of the pitfalls of this kind of tests and in an appreciation of their potential as an evaluation form. One of the interviewees describes, for example, the specific problem of multiple-choice tests becoming “guessing competitions”, with students answering in a random manner and hoping for some of the random answers to be right. Depending on the marking scheme, such a “random answer strategy” may result in students achieving a pass grade without deserving it.

One interviewee explains how he circumvents the problem by playing around the algorithm, attributing negative values to wrong answer:

Lecturer 2: The evaluation system is such that a wrong answer gets penalised. If you only give them [the students] zero points [for a wrong answer], then they have nothing to lose when taking a chance. But if, on the contrary, you say that a wrong answer results in negative points, then if you take a chance, you would have in a way not lost one, but two points.

¹ ‘bortvalg’ in Norwegian. In this context, the Norwegian word refers to the process of leaving out answers that are obviously unsuitable, and therefore ending up with a smaller set of possible right answers.

This example illustrates how lecturers at the Faculty of Engineering are aware of the inscription of the multiple-choice assessment tool, and how this awareness contributes to an effective use of the tool.

Altogether, we see that in spite of the expressed scepticism, multiple-choice tests are used and considered to be an appropriate assessment method, in particular because they can contribute to making the grading process smoother. Generally, the interviewees express a positive attitude to automatic appraisal of the students' knowledge, especially for those courses where the student numbers are high and where the assignment answers tend to be long.

Another positive aspect of multiple-choice assessment is that it contributes to thwart student cheating. Because the online tool allows for a fixed start time and a maximum amount of time to answer the questions, it is hoped that the restricted amount of time available to answer the test will reduce the chances of the students cheating in an assignment that counts as part of their final grade.

Department 2: Faculty of Education

According to Kolb (1981), the field of education belongs to the social professions, which are characterised by a focus on pragmatism and utilitarianism (Becher, 1989). It draws to a great extent to a science of philosophy tradition in order to gain insights into concrete and applicable issues. The pedagogical beliefs predominant in the field reflect the awareness that pedagogy is played out at two levels: as applied in a number of subject matters and as a discipline of its own.

At the Faculty of Education, the attitude among academic staff towards multiple-choice tools is quite different from the attitude at the Faculty of Engineering. The general standpoint on multiple-choice assessment methods is that they participate to a cognitive/behaviourist approach to learning against which the Faculty takes a strong stance. Assessment forms using a multiple-choice format are considered by many academics of the Faculty as incompatible with the socio-cultural philosophical approach that is widely embraced in the Faculty.

Some interviewees express some reserve towards the very idea of multiple-choice assessment. Interestingly enough, they seem to do so without having tried the tool themselves and without having considered whether the tool could be useful for them.

Interviewer: Then I would ask you: multiple-choice tool, have you used it [...]?

Lecturer 5: No, I haven't felt the need for it [...]. In other words, I think that ... it is not my style in a way. I don't teach that way. [...] I have a strong conviction that [the VLE] has nothing to do with ... [...]. My teaching just doesn't fit into a VLE-logic.

Other interviewees from the faculty have first-hand experience of multiple-choice assessment, and outline the advantages of using them for the purpose of practicing and drilling a particular type of knowledge. This type of assessment is typically used to support learning by rote, and is, in that sense rooted in a behaviourist perspective. However, those who have tried the tool are aware of its limitations, for instance technical difficulties related to the lack of special

characters for mathematics and name the example of “bugs” in the formula writing procedure that caused the system to collapse.

Another concern is that multiple-choice assessment is considered more appropriate for subject areas where there is a common agreement as to the existence of “exact knowledge”.

Lecturer 6: But I think that, in a way, I think that multiple-choice assignments have a function. Or, that is, that they can be just as nice as other assignments, but they are closed.

Another challenge that characterises the Faculty of Education is that the teaching staff sees their mission as two-fold: first, to raise the students’ knowledge of a number of subject areas and, second, to foster their didactic competence in those subject areas. In that respect, multiple-choice assessment could be seen as an appropriate tool for assessing the students’ proficiency within the various subject areas. However, the usefulness of multiple-choice assessments for the purpose of improving the students’ didactic competence is questioned.

Lecturer 6: You give an assignment where the one who formulates the questions knows very well beforehand what the answer is. And then you, as a student, just try to guess the right answer. [...] This is not the kind of things we want the students to spend their time doing throughout their studies.

In this second department, we see that members of the academic staff display a certain amount of reluctance towards the very idea of using multiple-choice tests as a didactic tool.

Department 3: Faculty of Nursing

Nursing as an academic field is relatively younger than engineering and education. It has been suggested that the discipline of nursing has struggled with finding an identity of its own (Butler, et al., 2006). Teaching programmes in nursing have traditionally been vocational in nature (Watson & Thompson, 2004) and professional associations have typically a strong say in the matter of defining relevant subject areas for courses in Nursing (Becher, 1989).

The data gathered from the Faculty of Nursing point towards a more unorthodox pattern of use of the multiple-choice tool. Some of the staff members at that faculty have discovered that the students had started to create multiple-choice questions for each other. This practice has been institutionalised through a common assignment whereby students develop multiple-choice questions in small groups and subsequently submit those questions to their fellow students.

An example of such a multiple-choice assignment is given by one of the interviewees:

Lecturer 9: So then they bring in question from anatomy, but also questions that relate to the [academic discipline of] nursing. How should one do this, should one... a patient who has breathing problems, for example, should he lie on his side, should he stand up, should he sit up, and so on. Or how long is the intestine, is it 3 meters, is it 5 meters, is it 10 meters? Which nutrients are absorbed where...

It appears that the use of this type of assignment has been the result of pure serendipity. In a first instance, students accidentally discovered that the multiple-choice functionality in the VLE was open to student users to create such tests in spite of the fact that the VLE manual claimed this function to be reserved to teacher users. They started creating tests for each other,

and made it known to their lecturer that they considered those “self-made” tests to be useful in their studies. The lecturer decided as an experiment to let them continue with this activity as a part of the class activities. The interviewees report that the purpose of implementing this activity in the class is to get the students first to actually get familiar with the curriculum and then to go deeper into the material that is available to them. They also report that the tests provide them with an opportunity to “drill” the material instead of just skim reading it. The use of multiple-choice assignments turned out to be so successful that the academic staff opted for a Faculty-wide implementation of this type of assignments, in all three years of the Bachelor programme.

The fact that the multiple-choice assignment is carried out within the realm of the VLE seems to have been an important element in getting the students motivated for preparing and carrying out the assignment. When asked whether the same assignment would have been just as popular if it had been conducted on paper, one lecturer answered that part of the “fun” element would then have disappeared.

Another lecturer at the Faculty mentions that the availability of multiple-choice tests can be used to pull in students that seem otherwise to have an offhand attitude towards school attendance.

Lecturer 8: I have a student who almost hasn't put a foot inside the building here, but that student did do the test.

Interestingly, one of the main motives of the assignment is to get the students to discuss among each other the choice and formulation of the questions and of the proposed answers. In particular, they are asked to provide feedback as to “how relevant and how valid” the questions are as regards to the curriculum.

Lecturer 9: There was a student, not this year but from last year who wrote: “I managed the test almost without having read anything at all. To me this indicates that the test was too easy. You guys have to perk up.” [...] and then there was another one who took another test and wrote: “I actually had to read a lot to get anywhere near a 100% right answer to the questions. You've really made a nice test.” And then they write about it.

It is interesting to note that the discussion that occurs in relation to the formulation of multiple-choice tests is taken into account in the formal assessment of the students. The written comments are included in an assessment portfolio and therefore count towards the final grade. One interviewee reports the process of “acquiring knowledge through the very act of writing” as a central element in the students' learning.

Although the academic staff members do not partake in any direct quality check of the questions and answers, they are actively involved in the process of facilitating the students' discussions about how to identify the important parts of the curriculum, how to assess them and what criteria should be used in the assessment process. One interviewee reported that the academic staff considers the feedback from fellow students to be at least as valuable as any feedback lecturers may themselves have given. This viewpoint rests on the observation that students are, at a particular point in time, generally more involved in the studied topic than their lecturers are.

This case study reveals that didactic practices that use multiple-choice tools extensively may help academic staff broadening the *repertoire* of assessment methods available within the realm of a socio-cultural approach to learning.

Discussion

In our study, the ANT terms translation, blackboxing, inscription are used not only to refer to the way technology is shaped by designers, but also to understand the way teaching practices may be shaped by the broadly accepted teaching practice, which reflects the predominant professional identity in a particular faculty. It may be noted that we are here using ANT concepts in a rather unorthodox way, for we consider both teaching practices and pedagogical beliefs as actants that influence and shape each other through processes of negotiation and alignment, in addition to the VLE itself.

It emerges from the data that patterns of use of the multiple-choice tool under investigation are highly influenced by the underlying pedagogical beliefs that are prevalent in the respondents' academic environment. In two of the faculties under investigation, the tool is considered to be an instrument best suited for a cognitive/behaviourist type of assessment and is therefore either adopted or rejected on the basis of that very "image".

At the Faculty of Nursing, the respondents do not express any particular preset pedagogical beliefs about multiple-choice tools. This lack of preconception may explain why the tool ends up being negotiated so as to fit into a new teaching approach, and thereby acquires a new status as an integral part of the assortment of assessment tools considered appropriate for socio-cultural learning. The tool is thus modified and, in so doing, becomes aligned with the epistemic culture of the community of practice. This process of negotiation, which is at the core of both ANT (e.g. Latour, 1996) and the literature on communities of practice (Wenger, 1998), renders an innovative attitude towards the MCA tools more palatable.

The findings from the Faculty of Engineering point towards a community of practice where multiple-choice tests are considered to be an acceptable form of assessment, at least in particular settings. At this faculty, we have observed a rather high receptivity to the three streams identified earlier: the interviewed lecturers are generally ready to embrace practices partaking of any of the three streams, but they are highly aware of whether or not they are appropriate to particular learning situations. MCA tools are only used in learning situations that are considered suited to it, and seem to always be used as intended by the designers, i.e. according to the initial inscription. In that sense, the inscription is rendered "irreversible" by the academics' loyalty to the original design of the tool, similarly to, e.g., the irreversibility of inscription of information infrastructure described in Monteiro (2000). The data suggests that the lecturers are generally familiar with the functionalities of the MCA tool, and do not feel the need to open the black box to investigate further the potential of the tool. Because the tool finds its natural place in the epistemic culture of the Faculty, its use does not seem to bring about any tension or struggle between artefact and professional identity. The direct use of the tool as intended by its designers makes the processes of translation mostly unnecessary. The blackboxing of the MCA tool

happens in line with the traditional argument that the blackboxing of an item is “made possible by the availability of credibility” (Latour & Woolgar, 1986, p. 242).

The Faculty of Education signalises a stronger sense of belonging to a certain teaching philosophy, namely the socio-cultural perspective. This teaching philosophy is so pervasive that it may be seen as generally inscribed into the lecturers’ professional identity. Because the multiple-choice assessment tool of the VLE is itself inscribed with a pattern of use that appears to represent a behaviourist and cognitive learning approach, it is not surprising that it is disregarded as an inappropriate learning tool. The fact that those two sets of inscription seem to come to a clash results in a lack of interest for opening the black box of the VLE-based multiple-choice assessment function. In contrast with the Faculty of Engineering, the academics at the Faculty of Education do not attribute any credibility to the MCA tool. Here, it can be argued that the very reason for blackboxing the tool is that it lacks credibility in the eyes of the academics.

Through their reluctance towards opening the black box, the academics at the Faculty of Education remain faithful to a preset understanding of multiple-choice tools as incompatible with the contemporary epistemic culture at the Faculty. The conflict between the pedagogical beliefs at the Faculty and the inscribed purpose of the tool reflects an essential disagreement about what can be deemed to be appropriate didactics. The fundamentality of this conflict brings about a general attitude towards MCA tools whereby VLE users take such a forceful stand against the tool that they do not even consider either to negotiate with that part of the system or to translate it to fit their purposes.

The findings from the data gathered about the Faculty of Nursing point towards a third pattern of use, with a stronger element of participation and reification. It can be suggested that members of staff at the Faculties of Education and Engineering associate MCA with summative assessment, whereas nursing students appeared to be unaware of this inscription and therefore used the tool formatively. The interplay of participation and reification brings about new meanings and new practices, in addition to making “people and things what they are” (Wenger, 1998, p. 70). The data presented in the last section suggests that the lecturers at the Faculty of Nursing use the VLE as an ally in the process of encouraging student assiduity with regards to getting a better grip on the curriculum. In ANT terms, it can be purported that the lecturers “enrol” the VLE and its multiple-choice assessment tool in the process of strengthening the network that originally consists of the core triangular relation between lecturer, curriculum and student. In this new constellation of actants, the lecturers’ role is relegated to the background as they are no longer involved in directly conveying the content of the curriculum to the students. Instead, the lecturers act as facilitators in the process of promoting the students’ familiarity with the curriculum. This, we believe, provides a good illustration of how a multiple-choice tool can become a crucial element in the development of a new socio-cultural learning environment, where students get more out of discussing a subject with each other than out of feedback from the teacher.

Professional identity within faculties of nursing has been described heavily connected to the nursing profession (Andrew, et al., 2009). The apparent lack of a prevalent pedagogical belief inscribed in teaching practices at the Faculty of Nursing may be one of the reasons why the lecturers’ approach to learning and assessment appears to be somewhat eclectic. The lecturers

may therefore feel freer to let their curiosity take the lead when devising learning practices. When taking in the MCA function, the inscribed purpose of the tool is partly ignored. This inspires the lecturers to open the black box and translate the MCA function into an ally that facilitates a whole new practice. The opening of the black box allows for an apparently paradoxical use of a behaviouristically inscribed tool to support activities that almost epitomise a socio-cultural learning philosophy. By allowing themselves to *participate* to the workings of the VLE, the involved lecturers can be seen as paving the road for a change in their community of practice and for a new epistemic culture.

Professional identity and epistemic culture in the light of ANT

This paper has outlined three sets of didactic practices where the use of VLE-based multiple-choice tools has very different statuses, and has explored how this difference in attitudes may be understood as related to differences in epistemic cultures. The analysis of the data suggests that the inscription of a particular pedagogical philosophy at a departmental level plays a key role in the lecturers' inclination to open the black box of the VLE tool, and in their willingness to dare negotiate and translate it for their particular didactic practices.

Because the VLE-based MCA tool is a technological implement, it makes sense to use ANT as an analytic tool for understanding the data. Our study suggests that professional identities and epistemic cultures are shaped both by human actors and by non-human actants. For example, at the Faculty of Nursing, some of the staff members have been inspired to change their didactic practices through the discovery of new modes of learning made possible by a technological artefact, in this case the VLE. Conversely, it emanates from the interviews at the Faculty of Education that the epistemic culture plays a more significant role in the choice of didactic practices than the technological artefacts available.

The *forte* of ANT is that it can provide a large range of nuances in the description of the technology's influence on epistemic cultures. First of all, the conceptual framework provided by ANT offers tools that may help uncover the nature and strength of the *inscription* of technological artefacts. It draws attention to the power that is played by elements that lie outside the realm of the community of practice. For example, the designers of the MCA tools, by investing the tool with a clear purpose of measuring exact knowledge, have a *de facto* power on the users of the tool. Secondly, ANT may be a useful analytical tool to render the processes of *negotiation* and *translation* that happen when users take on an inscribed tool. For instance, our study provides a description of the processes of translating the MCA tool into a device for socio-cultural learning in the example of the Faculty of Nursing. Thirdly, findings from our study indicate that a strong epistemic culture within a faculty may bring about a "take it or leave it" attitude towards the MCA tool. Within such cultures, the MCA tool may remain *blackboxed* as users may not be inclined to negotiate with it or translate it.

Further research may involve investigating the use of multiple-choice tools in different contexts, for example in other faculties, in other educational institutions, or within the realm of workplace-based learning and information sharing. A deeper examination of the learning

implications of using “non-traditional” multiple-choice assessment forms may also be an interesting focus for further investigation of the issues raised in this article.

Another, broader contribution of our research might be that it suggests the existence of a relationship between the teachers’ didactic practices and the strength of their conviction into the pedagogical philosophy they relate to. In this article, we have seen that lecturers whose relation with a pedagogical philosophy is relatively loose have dared to carry out pedagogical experiments with technology. In contrast, lecturers that appear to have strong epistemological beliefs about the nature of didactics and pedagogy seem to be more restrictive in their choice of pedagogical tools.

We acknowledge the limitations of this study that is based on only nine interviewees and three faculties within the same institution. It would be interesting to examine further whether the insights from this study might have a more general resonance in the world of didactic practices. For example a quantitative survey building on this study and involving higher numbers of respondents from the three faculties in this study may provide interesting insights into pattern of use and attitudes towards online MCA tools. It might also be interesting to extend the survey so as to include a larger number of faculties or other institutions.

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References

- Akrich, M. (1992). The de-scription of technical objects. In W. E. Bijker & J. Law (Eds.), *Shaping technology / building society: Studies in sociotechnical change* (pp. 205-224). Cambridge, MA: The MIT Press.
- Andrew, N., Ferguson, D., Wilkie, G., Corcoran, T., & Simpson, L. (2009). Developing professional identity in nursing academics: The role of communities of practice. *Nurse Education Today*, 29(6), 607-611.
- Archer, L. (2008). The new neoliberal subjects? Young/er academics' constructions of professional identity. *Journal of Education Policy*, 23(3), 265-285.
- Barton, D., & Tusting, K. (Eds.). (2005). *Beyond Communities of Practice: Language, Power and Social Context*. Cambridge: Cambridge University Press.
- Becher, T. (1989). *Academic Tribes and Territories. Intellectual enquiry and the cultures of disciplines*. Bristol: The Society for Research into Higher Education & Open University Press.
- Becker, H. J., & Ravitz, J. (1999). The influence of computer and internet use on teachers’ pedagogical practices and perceptions. *Journal of Research on Computing in Education*, 31(4).
- Bijker, W. E., Hughes, T. P., & Pinch, T. J. (1987). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, Mass: The MIT Press.
- Bruner, J. S. (1996). *The Culture of Education*. Cambridge, Mass.: Harvard University Press.

- Butler, M., Treacy, A., Scott, A., Hyde, P., MacNeela, K., Irving, A., et al. (2006). Towards a minimum data set for Ireland: making Irish nurses visible. *Journal of Advanced Nursing*, 5(3), 364-375.
- Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay. In J. Law (Ed.), *Power, Action and Belief. A New Sociology of Knowledge?* (Vol. Sociological Review Monograph 32). London: Routledge & Kegan.
- Callon, M., & Latour, B. (1981). Unscrewing the Big Leviathans: How Do Actors Macrostructure Reality. In K. Knorr & A. Cicourel (Eds.), *Advances in Social Theory and Methodology: Toward an Integration of Micro and Macro Sociologies* (pp. 277-303). London: Routledge.
- Contu, A., & Willmott, H. (2003). Re-Embedding Situatedness: The Importance of power Relations in Learning Theory. *Organization Science*, 14(3), 283-296.
- Fetterman, D. M. (1998). *Ethnography: Step by Step*. Thousand Oaks, London, New Dehli: Sage Publications.
- Fox, S. (2000). Communities of practice, Foucault and Actor-Network Theory. *Journal of Management Studies*, 37(6), 853-867.
- Greeno, J. G. (1997). Theories and practices of thinking and learning to think. *American Journal of Education*, 106(1 Nov 1997), 85-126.
- Greeno, J. G., Collins, A. M., & Resnik, L. B. (1996). Cognition and learning In R. C. Calfee & D. C. Berliner (Eds.), *Handbook of educational psychology* (pp. 15-46). New York: Simon & Shuster Macmillan.
- Henderson, M., & Bradey, S. (2008). Shaping online teaching practices: The influence of professional and academic identities. *Campus-Wide Information Systems*, 25(2), 85-92.
- Hughes, J., Jewson, N., & Unwin, L. (Eds.). (2007). *Communities of practice. Critical perspectives*. New York, NY: Routledge.
- Jensen, K., & Lahn, L. (2005). The binding role of knowledge: an analysis of nursing students' knowledge ties. *Journal of Education & Work*, 18, 305-320.
- Jewson, N. (2007). Cultivating network analysis: rethinking the concept of 'community' within 'community of practice'. In J. Hughes, N. Jewson & L. Unwin (Eds.), *Communities of practice. Critical perspectives*. New York, Oxon: Routledge.
- Judson, E. (2006). How teachers integrate technology and their beliefs about learning: Is there a connection? *Journal of Technology and Teacher Education*, 14(2).
- Knorr Cetina, K. (1997). Sociality with objects: social relations in post-social knowledge societies. *Theory, Culture and Society*, 14(4), 1-25.
- Knorr Cetina, K. (1999). *Epistemic cultures: How the Sciences make Knowledge*. Cambridge, Mass.: Harvard University Press.
- Kolb, D. A. (1981). Learning styles and disciplinary differences. In A. W. a. A. Chickering (Ed.), *The Modern American College: Responding to the New Realities of Diverse Students and a Changing Society* (pp. 232-255). San Francisco, CA: Jossey-Bass.
- Latour, B. (1987). *Science in Action*. Cambridge, MA: Harvard University Press.
- Latour, B. (1988). *The Pasteurization of France*. Cambridge, Mass and London, England: Harvard University Press.
- Latour, B. (1991). Technology is society made durable. In J. law (Ed.), *A Sociology of Monsters* (pp. 103-131). London: Routledge.

- Latour, B. (1992). Where are the missing masses? The sociology of a few mundane artefacts. In W. E. Bijker & J. Law (Eds.), *Shaping technology / building society: studies in sociotechnical change* (pp. 225-258). Cambridge MA: The MIT Press.
- Latour, B. (1993). *We have never been modern*. Hemell Hempstead: Harvester Wheatsheaf.
- Latour, B. (1996). *Aramis, or the Love of Technology*. Cambridge, Mass: MIT Press.
- Latour, B. (1999a). Circulating Reference. Sampling the Soil in the Amazon Forest. In B. Latour (Ed.), *Pandora's Hope. Essays on the Reality of Science Studies*. Cambridge: Harvard University Press.
- Latour, B. (1999b). On Recalling ANT. In J. Law & J. Hassard (Eds.), *Actor Network Theory and After* (pp. 15-25): Blackwell.
- Latour, B., & Woolgar, S. (1986). *Laboratory Life. The Construction of Scientific Facts*. Princeton, NJ: Princeton University Press.
- Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge: Cambridge UP.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed. ed.). Thousand Oaks, California: Sage.
- Monteiro, E. (2000). Actor-Network Theory and Information Infrastructure. In C. Ciborra (Ed.), *From control to drift. The dynamics of corporate information infrastructure* (pp. 71-83): Oxford university press.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, California: Sage.
- Piaget, J. (1970). *Science of education and the psychology of the child*. New York: Orion Press.
- Ravitz, J. L., Becker, H. J., & Wong, Y. T. (2000). *Constructivist-compatible beliefs and practices among U.S. teachers. National survey 1998 "Teaching learning and computing"* (No. 4). Irvine: University of California.
- Reid, A., Dahlgren, L. O., & Petocz, M. A. (2008). Identity and engagement for professional formation. *Studies in Higher Education*, 33(6), 729-742.
- Skinner, B. F. (1989). Teaching machines. *Science*, 243(4898), 1535-1535.
- Smeby, J.-C. (2006). *Professionalism in a knowledge society: the academic drift of professional education in the "new" professions*. Paper presented at the 4th Interim Meeting, European Sociological Association's Research Network "Sociology of Professions": "Professions, Globalization and the European Project: Shifting Spheres of Opportunity". from <http://www.hio.no/content/view/full/48136>
- Swan, J. A., Scarbrough, H., & Robertson, M. (2002). The Construction of 'Communities of Practice' in the Management of Innovation. *Management Learning*, 33(4), 477-496.
- Vygotsky, L. (1978). *Mind in society: the development of higher psychological processes*. Cambridge, MA,: Harvard University Press.
- Watson, R., & Thompson, D. R. (2004). The trojan horse of nurse education. *Nurse Education Today*, 24 73-75.
- Wenger, E. (1998). *Communities of Practice, Learning, Meaning, and Identity*. Cambridge, New York: Cambridge University Press.
- Winberg, C. (2008). Teaching engineering/engineering teaching: interdisciplinary collaborating and the construction of academic identities. *Teaching in Higher Education*, 13(3), 353-367.
- Yin, R. K. (1989). *Case study research: Design and methods*. Newbury Park: Sage.