

Between humanism and competitiveness - Towards an intercultural ethos for engineers

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INTRODUCTION

Ever-increasing globalisation in a complex, competitive and highly technical world has raised the question of ethics and social responsibility for many companies, organisations and individuals. Such sociotechnical issues have a huge impact on both engineering practices and education and the question of intercultural competences in an increasingly changing and mobile world is at the core of this debate. In this article, we revisit data from 10 years of practice and research on the intercultural competences developed and displayed both by student engineers in two French Graduate Engineering Schools, *ENSTA Bretagne* and *Telecom Bretagne*, in class and during academic mobility, and professional engineers in an international context, as SME exporters or as trainers involved in technology transfer. Our research shows a need for both humanism and competitiveness, identified by the informants themselves, and supported by their degree of commercial or academic success.

After establishing the context for our research and briefly describing our methodology, we will then present our Intercultural Management Competences Model or IMCM. This model is positioned between the definitions deriving from research in the Humanities and Social Sciences, which tend to focus on an idealised view of humanity, and those from Cultural Intelligence research, which emphasize cultural fact-finding and competence development for commercial ends [1] [2]. Focusing on observations made by the engineers and student engineers themselves and highlighted by our model, we then suggest a framework, combining humanism and competitiveness, which we call *intercultural ethos for engineers*. This concept, based on the two Greek definitions of ethos, (“*èthos*” (ἦθος) and “*éthos*” (ἔθος)) includes cultural and intercultural competences, values and ethics but also self presentation, representation and negotiation of identity which can be observed and analysed in the discourse of practicing and student engineers [3].

1 THE CONTEXT

Much of the work on Engineering Education in the last decade has stressed the need for increased interdisciplinarity, with the aim of training the well-rounded engineer, not only a competent technician, systems developer and problem-solver, but also a leader and innovator, with strong negotiating and communication skills and a grasp of contemporary issues, such as sustainability and globalisation [4] [5] [6]. The French graduate engineering schools have a tradition of commitment to the inclusion of Humanities, Social Sciences and Language training in their curriculum, albeit to varying degrees. For instance, one of the oldest and most prestigious schools, *Ecole Polytechnique*, has had a Chair in History or Literature since the 18th century [7]. The French Engineering Accreditation Board

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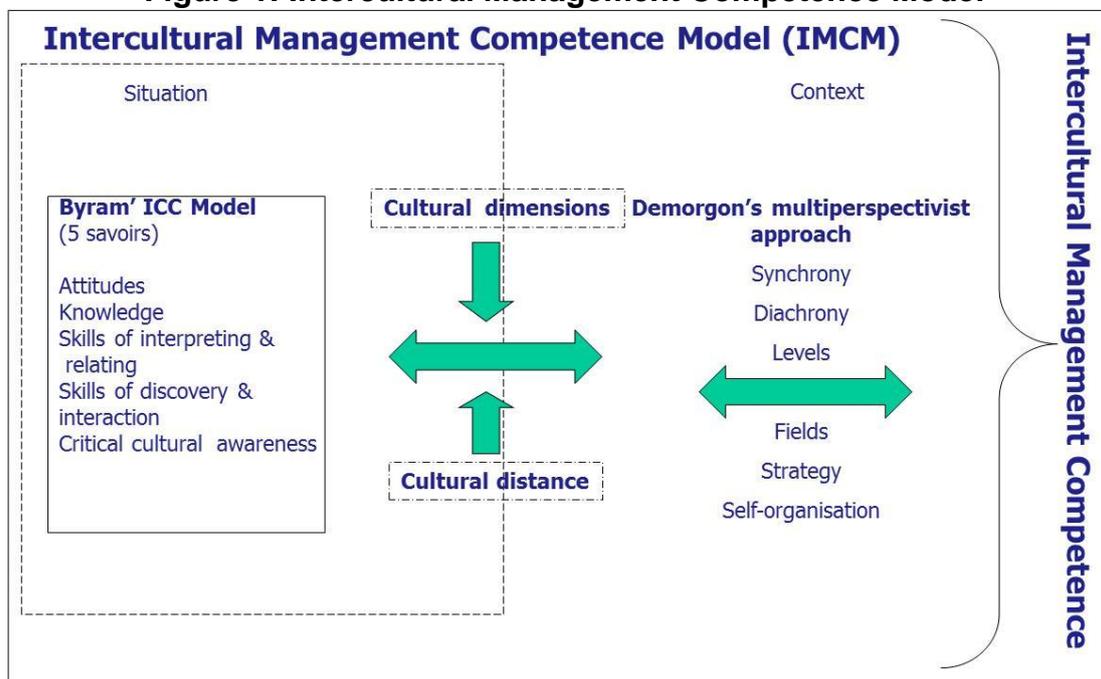
(Commission des titres d'ingénieurs, or CTI) emphasizes the need for internationalization for future engineers, requiring all graduates to have a certified level of English proficiency and a two month stay abroad [8]. *ENSTA Bretagne* and *Telecom Bretagne* go beyond this requirement, so that students study at least two foreign languages, communication techniques, social responsibility and sustainability and intercultural communication and management, along with more traditional scientific courses and project and problem based learning. Both schools have established research groups working on the Social Sciences and Humanities.

2 METHODOLOGY

Based on ten years' teaching and research focused on the identification, development, assessment and analysis of Intercultural Management competences, we developed an Intercultural Management Competence Model (IMCM). Our methodology included participant observation [9], using field notes, teaching diaries, classroom observation, analysis of student oral and written production and self assessment statements, of some 1,000 student engineers, aged from 20 to 25, from 50 different countries and with between 10% and 20% of women. We also used semi-guided interviews with 11 students on mobility programmes, as well as with 10 French and 10 German professional engineers from SMES exporting in the CEE countries and 31 French engineers working as trainers in a technology transfer project between France and Brazil. The research paradigm for the latter was based on the qualitative content analysis of interview verbatims, a methodology recommended by Rae & Carswell [10] to "identify and analyse" intercultural skills. This narrative and interpretative framework is gaining increasing stature as a rich, meaningful data source [11] and is being used more and more widely by researchers such as Cope [12] and Rogoff et al. [13].

3 THE IMCM MODEL

Figure 1: Intercultural Management Competence Model



Our IMCM model, which is presented above, is based on an intercultural definition of intercultural competence, drawing on definitions by Landis & Bennett [14], Meier [15], and Knapp & Knapp-Pottoff [16], namely "the ability to interact appropriately in different cultural situations and contexts" [17] [18]. This appropriate interaction requires skills involving different cognitive, emotional and behavioural processes which operate at different levels of cultural awareness and may be influenced by attitudes, motivation and context.

To identify and analyse these intercultural skills, we used the *five savoirs model*, which was developed as guidelines for the skills and competences aimed at in the teaching of language and culture [19] [20] [21]. The 5 *savoirs* include *savoir-être (attitudes and values)*, for instance, curiosity, openness, and the

ability to stand back from one's own cultural standpoint; *savoirs (knowledge)*, specific and general cultural knowledge of both the visible and invisible aspects of culture; *savoir-faire & savoir apprendre (skills of discovery and interaction)*, the ability to acquire, demonstrate and operate cultural knowledge and appropriate attitudes and skills; *savoir-comprendre (skills of interpreting and relating)*, the ability to interpret ideas, documents or events from different cultures and to relate them to one's own and others' social identity and *savoir s'engager (critical cultural awareness)*, the ability to evaluate products, processes and practices of your own and other cultures and to adopt new perspectives.

An analysis of these interpersonal skills, which posit a humanistic view, is complemented by the identification of different cultural variables or value orientation models, known as cultural dimensions, such as attitudes to time (monochrony/polychrony), communication (high/low context) and space (proxemics) [22] [23] or Hofstede's 5 dimensions: individualism vs collectivism, power distance, uncertainty avoidance, masculinity vs. femininity, time orientation [24] [25]. These are useful to categorise certain cultural differences or tendencies and help us to identify the different areas of knowledge and expertise displayed by the informants. However, these dimensions cannot explain the cultural behaviour of individuals and the organisation and strategies of companies or of Higher Education institutions.

Demorgon's multiperspectivist approach, which completes our model, draws on these dimensions, but sees them not as merely descriptive but as bipolar opposites, or "binary adaptive antagonisms". They can be presented along a continuum, where the motivated, informed individual can choose either to adapt to them or to oscillate between them. In other words, although different cultures may prefer different tendencies or patterns, the individual who has the time and the inclination does not have to act in a culturally biased way but can choose a range of possible actions. Our informants' focus and areas of knowledge and expertise are established by differentiating between six levels of contextual influence, using the six perspectives detailed in Demorgon's multiperspectivist approach [26] [27] [28]. These include the *field* (religious, political, economic or technological) and the *levels* (individual, corporate and/or national) where cultural interactions take place. Demorgon makes a distinction between what is dependent on *self-organization* (or dealing with uncertainty) and what is dependent on the *strategy* of the different actors. A company or a University needs a *strategy* which may or may not be culturally influenced, but its members must also be open and adaptable to unpredictable factors or changes. Culture is seen as an on-going process which can be changed over time, so *synchronic* intercultural situations should also be analysed from the *diachronic* or time perspective.

4 SUMMARY OF PREVIOUS RESULTS

The detailed results of these interviews and observations through the triangulation of different models in our three-tiered analysis have been presented elsewhere but could be summed up as follows. While the most proficient students from both schools demonstrate intercultural competences including most of the *savoirs* and *fields*, the vast majority relied mostly on *savoir-être*, such as positive attitudes, openness and some decentring [20], "personal orientation" [29], at the "individual level" [26]. They showed some *savoirs*, such as the cultural dimensions in the literature and favoured the technological and economic fields. In their wish to build efficient teams they tended to deny cultural differences, summed up by one Spanish student who explained: "*We all speak the same language, we're all engineers*". The students on mobility programmes also relied heavily on interpersonal skills, with very little prior knowledge of the country or educational system and tended to minimise cultural differences, operating, in their own words, in a kind of "no-man's land" or international space within the national one. The more experienced professional engineers also had different levels of intercultural competence with, predictably, the most successful in business having the widest range of skills. Although they were in a highly competitive context, they also displayed strong humanistic competences. Like the students, the French engineers tended to privilege interpersonal skills and the technological and economic fields, with *savoirs* about history or politics while their German counterparts were more "task oriented", using more *savoirs* at the corporate and societal level, with more *savoirs* about infrastructure. A certain amount of decentring was achieved by all the engineers in the studies and they modified their behaviour according to the cultural or economic context.

5 BEYOND THE IMCM MODEL

Our IMCM model has proved useful for curriculum development, when combined with self-assessment tools as an assessment grid for written work and oral presentations, and also as guidelines for

improved intercultural practice for both students and professional engineers. However, it also revealed unexpected outcomes which demanded a further interpretative framework. We noted that the operation of intercultural competences depends on context and situation and that for some students there was a discrepancy, or lack of coherence, between their interpretation of their intercultural stance in their reports or other written documents and their oral presentations during interactive poster sessions. For instance, they paid lip service to successful intercultural interactions but could happily assimilate their African team members by introducing them as French. Similarly, there were differences between the actions reported by the practicing engineers and our observations. We also concluded that the individuals in the studies oscillated between opposite cultural dimensions, in order to adapt to a situation and to a context. This oscillation seemed to present a real tension, especially for the practicing engineers, not only between their culture(s) of origin and the culture(s) of their business partners or customers but also between technology and personal relationships, competitiveness and humanism. Finally, we observed a very different stance from our own as researchers in Intercultural management, namely learning uniquely through practice and the use of more pragmatic categories, such as risks and dilemmas [30].

6 PROFESSIONAL ETHOS: “ÈTHOS” AND “ÉTHOS”

To analyse our data further, with the aim of providing a contribution to the understanding of how engineers behave in an international or intercultural context, we draw on the two notions of “èthos” and “éthos”, which we see as a new set of adaptive antagonisms. In the following we explain these two notions and that of a professional ethos, before presenting our emerging *Intercultural ethos for engineers* framework. The notion of “ethos” goes back to Aristotle’s rhetoric [31] and concerned the image the orator gave of him or herself in a formal speech. If the orator wanted to give the impression (demeanor) of an honest person, s/he had to show it implicitly through gestures, intonation and behaviour and not explicitly in speech. The term ethos is derived from two Greek words, “èthos” (ἦθος) and “éthos” (ἔθος). The first, “èthos”, (ἦθος) means way of being, character and mindset, while the second, “éthos” (ἔθος) stands for customs and habits. In the course of history, the different accents have disappeared but it is useful, for research purposes, to show the difference between the two terms [3]. Fusulier [32] defines the notion of ethos as a heuristic concept applied in sociology to analyse and understand observable aspects of human behavior. In modern sociology, “èthos” (ἦθος) means self-representation, representation and negotiation of identity, while “éthos” (ἔθος) stands for values and ethics. What we call intercultural ethos which we describe in more detail later, is a conscious combination of both these notions and an awareness of the potential tensions between them. A professional ethos, as defined by Jorro [33] also combines the two notions in an ongoing process of construction, where an individual tries to show professionalism through the acquisition of norms, rules and habits belonging to his or her professional culture. Therefore, a professional ethos can be seen as a repertoire of common practices that an individual can draw on. Common practices and reflective practices facilitate the emergence of a common ethos in a professional community.

7 APPLYING THE NOTION OF ETHOS TO OUR DATA

In our research on engineers involved in training programmes for international technology transfer [34], we concluded that, in general, engineers construct their professional ethos based on discourse about science and technology. When they stand back and reflect on their activity, they see their practice as science-driven, rational, logical and objective. Engineering students, young practicing engineers or engineers without customer contact or teamwork experience tend to see problems and solutions as merely technological. However, after closer analysis we also found that the engineer/trainers constructed their professional ethos while trying to find a balance between three possible perspectives. If they chose the technological perspective, they focused on products and on their company. If they adopted a sales perspective, they placed the emphasis on customers and on the foreign company, whereas if they chose the training perspective, they concentrated on the teaching-learning relationship with their trainees from different cultures. In their professional ethos, they are exposed to contradictions between technology and their relationship with customers. Although they may indeed be mostly technology and product-oriented, they also have to adapt to sales contexts driven by customers who do not deal only with technology. These engineers are exposed to dilemmas, when they have to make a choice between the three different perspectives. Preferring one perspective to the two others poses a great risk, while going too far with one perspective may result in neglect of the product and the interest of the company or of the sales

relationship with the customer. If engineers, with less practice, cannot find a balance between the three perspectives they can put their home company, the product or their relationship with customers at risk.

This example illustrates the first salient point revealed by revisiting our data. The professional ethos describes part of the story but another ethos, namely intercultural ethos, as presented above, is needed to further clarify the intercultural situation. Indeed, the international context may lead to further tensions, where a successful balance must be found between professional ethos (home company, product and customer) and an intercultural ethos (competences/skills, knowledge and attitudes). A lack of intercultural ethos can endanger the relationship with the customer and severe problems with both professional and intercultural ethos may put the engineer in a situation of failure. The most successful engineers seem to be able to reconcile a professional and intercultural ethos and furthermore achieve a balance between the humanistic side and the technological side, even in a competitive environment.

The second most salient point to emerge from this initial reanalysis of our data is the fact that both aspects of ethos, "èthos" (ἦθος) and éthos" (ἔθος), are clearly demonstrated in an intercultural situation. The coexistence of the two notions, expressed as opposites or adaptive antagonisms, can be explored to further explain the tensions experienced in an intercultural situation. For instance, our results revealed that some engineers in the studies showed intercultural competences in terms of self-representation, and negotiation of identity, or "èthos" (ἦθος), which were difficult to separate from their cultural values and their own ethical behavior, or "éthos" (ἔθος). When they showed a high level of intercultural competences, both aspects were successfully integrated. This can be observed in the following example, taken from an interview with a German engineer doing business with clients from Lithuania:

"I could go up the wall when I hear opinions why the business has failed with the partners from Lithuania. You really cannot expect it to work if you simply hand over a technical drawing and tell them: please produce this, but of course much cheaper than us. It is necessary to connect these suppliers to their own processes. An established partnership, which is close and based on confidence, provides a big advantage in the long run. It is inevitable that know-how is transferred. Of course one day they will have the same expertise as we have."(German engineer 4, 2007)

Here this successful engineer's personal values coincide both with a humanistic view of his Lithuanian clients and of the probable long-term effects of technology transfer and a shrewd awareness that building up relationships and trust is also beneficial commercially. On the other hand, when there were problems of intercultural communication and management, such as difficulties in negotiation of identity or a discrepancy between culturally embedded differences in self-representation or in values their "èthos" (ἦθος) and éthos" (ἔθος) did not overlap. For example, two less successful German engineers in the same cohort found it difficult to build up the long term personal relationships required by their Lithuanian partners but attributed their problems to facts, figures or technology:

"Lithuanians are very hospitable, very open-minded, the Managing Director and his sales manageress spoke German perfectly but no confidence was built, probably because of too different price ideas."(German engineer 1, 2007)

"Cooperation is very good, in the private sphere and in business. It is very important to set up a personal relationship and to build trust in the long term. People in Lithuania are distrustful and are afraid they won't get paid for example. We have to give them the feeling that they are very important for us."(German engineer 2, 2007)

The second example can be contrasted with that of one of the successful French engineers, for whom the process of building up personal relationships with clients and agents corresponded to his cultural and personal values and not simply what he felt should be done:

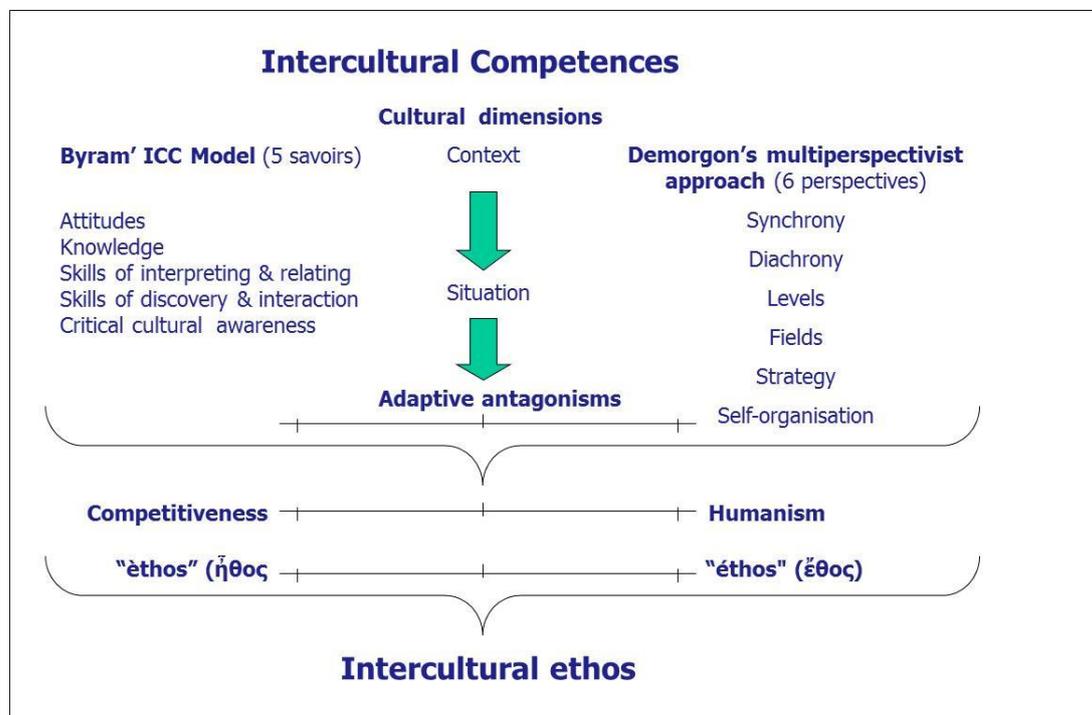
"As soon as you find a new customer, you have to pay a visit to him. The Lithuanians are very keen on personal contact (...). In this country, unless you are a multinational company, especially in this market, you need an agent there. And if you want him to do a good job, you often have to go out for dinner and for a drink with him. This belongs to the reminiscence of the old days.... It's true, you have to know people very well there and it's actually the nice part of business. If I had to give at least one piece of advice to SMEs: find a good agent there and build up a very close relationship with him."(French Engineer 2, 2007)

A similar situation in terms of “èthos” (ἦθος) and éthos” (ἔθος) was observed with the student engineers. As we mentioned previously, the students stressed the importance of skills or attitudes of adaptability, openness, empathy or cooperation, with the need to “accommodate to others so they can understand us” and for “patience and tolerance if there are language problems and cultural differences” (Group 1 Telecom-Bretagne 2004). However, while recognising that: “foreigners with language problems can be excluded from the group” (Group 10 Ensta Bretagne, 2013), several groups seemed unaware that this situation was being enacted in front of their eyes. For example, in one group of 1 Polish, 2 French and 3 Francophone African students, who admitted that there was “a problem of language diversity so we chose French” (Group 3 Telecom-Bretagne 2007), the Polish student was observed to remain silent throughout the proceedings. This example illustrates the discrepancy between what the students say they are doing (“èthos” (ἦθος)) and the culturally embedded hegemony of the French language (éthos” (ἔθος)).

The students who achieved excellent academic results in terms of Intercultural Management competences, as defined above, also appeared to successfully combine both aspects of ethos. For instance, one group of students from five different countries both identified and demonstrated sophisticated intercultural skills, knowledge and attitudes. They summed up their learning experience as follows:

“An intercultural team must be able to value the different visions of life, work, human relationships of each of its members in order to generate a richness of ideas which could not be found in a monocultural team. [...]. Each of us brought our vision of things influenced by their personality and their culture. In spite of our differences of opinion about some subjects, we were able to arrive at a consensus through discussion. The project work was an enriching and instructive experience for us which could be useful in our professional lives. To conclude, we can say that we were lucky to work in a group of 5 people from 5 different cultures and we all agree on the following expression: ‘Richness comes from diversity’ ”. (Group 5 Telecom-Bretagne 2007)

Figure II: Intercultural ethos for engineers framework



CONCLUSION

In this paper, we have presented an initial reanalysis of the results of 10 years' practice and research on the transformation of international experience into intercultural competences and suggested a framework, combining humanism and competitiveness, which we call *intercultural ethos for engineers*. This concept includes cultural and intercultural competences, values and ethics but also self

presentation, representation and negotiation of identity which can be observed and analysed in the discourse of practicing and student engineers. It uses both aspects of the Greek notion of ethos, “èthos” (ἠθος) and “éthos” (ἔθος), presented as adaptive antagonisms. We focused on two main salient points, namely the potential tension between professional ethos and intercultural ethos in an international situation and the fact that the two aspects of ethos appeared to be totally integrated in a successful intercultural business or academic situation, whereas there was a discrepancy between the two for the less successful informants. Finally, contrary to a certain vision of cultural intelligence, a balance was seen to be achieved between humanistic qualities and competitiveness, also expressed as adaptive antagonisms or dilemmas. This work in progress aims to provide a contribution to the development of pertinent intercultural competences for the global engineering community. Many questions remain to be explored, for instance if it is possible to apply the framework to engineers in a wider context and if there is, as we tentatively claim, a specific ethos for engineers. We intend to further explore the wealth of information we have obtained from both practicing and student engineers to see, as one of group of students put it, if there is more evidence of “*Congruence, or agreement between what one does and what one is*” in order to combine professional achievement with humanistic values.

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