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Communities of practice for developing intercultural competence

Zorica Nedić & Andrew Nafalski

University of South Australia
Adelaide, Australia

ABSTRACT: International collaboration has inevitably become a part of the engineering profession. Consequently, it is natural for universities to include topics related to intercultural communication into their undergraduate engineering curricula to prepare graduates for their future career. As the majority of engineering students are focused on acquisition of technical knowledge, it is important to integrate properly elements of intercultural communication into their technical activities, otherwise students might consider them to be an extracurricular burden and, thus, will not take the full benefit of the training in this important area. At the University of South Australia (UniSA), School of Electrical and Information Engineering, a framework for enriching students' learning experience through international on-line collaboration was developed. The framework considers three aspects that are important for successful international on-line collaboration: discipline knowledge, enabling technology and intercultural competence. The framework supports the learning of international collaboration skills through the process of on-line interaction with students from different countries. As such, it acknowledges the importance of the social aspect of learning, and is based on the concept of communities of practice. In this article, the community of practice as a concept suitable for this project is presented.

Keywords: International collaboration, engineering education, community of practice, intercultural communication

INTRODUCTION

World globalisation requires global engineers, that is, engineers able to work as members of internationally distributed teams [1]. To this end, they need to be interculturally competent. Although modern universities recognise the industry need for interculturally competent graduates, but there are numerous questions to be answered about what it means to be interculturally competent.

Developing intercultural competence is a lifelong process and, at any point in time, it is impossible to say that a person is culturally competent. Knowledge of languages certainly reduces barriers in communication. However, language knowledge is not sufficient, neither is spending some time abroad, but they may be a start. The aim of this article is to introduce the community of practice concept as a suitable context in which students learn intercultural skills through on-line participation in professional activities with students from other countries.

COMMUNITY OF PRACTICE

In this project, the learning of international collaboration skills is placed within the concept of the *Community of Practice*, introduced by Lave and Wenger as part of a more general social theory of learning [2]. Unlike the majority of theories that treat learning as an individual process in which humans acquire knowledge of objects or abstract categories, Lave and Wenger argue that learning is a social phenomenon as it occurs in a community through interactions of the members and for the benefit of the members as social entities of the community. In fact, there are many aspects of learning and as many theories of learning.

However, in this project, the focus is on social aspects of learning as students acquire knowledge while involved in professional activities, through interactions with other students in small internationally distributed groups. Therefore, these small groups are identified as communities of practice defined by Wenger as *groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly* [3].

It is believed that there are so many different communities of practice that even this broad definition may not include every type of community of practice. For example, students in this project may interact regularly, but only for a limited time, while involved in activities set by the teacher. However, the authors have adopted the community of practice concept as a form of situated learning, where community members learn through interactions within a group by participating in a common activity.

WHY THE COMMUNITY OF PRACTICE CONCEPT?

Some may question the suitability of the community of practice concept as a model for students' collaboration in the project. The community of practice concept was originally introduced to describe learning in the context of apprenticeships, where new apprentices learn from senior members of the group through mutual engagement in a shared practice [2]. Lave and Wenger describe how participation of new apprentices moves over time from *legitimate peripheral participation* (LPP) towards *full participation* as they acquire mastery knowledge [2]. However, later there have been departures from the assumption that in communities of practice all participants move from peripheral to full participation [4]. Although it may be compulsory in learning environments such as traditional apprenticeship, with the adoption of communities of practice as a model of situated learning for many other learning environments, it has been accepted that not all participants are able or aspire to achieve full participation. There may even be members who choose not to participate for various reasons, such as not accepting some of the community norms, or because their participation is marginalised by core members when there is an issue of power imbalance within the community of practice. This is certainly a situation the authors intended to avoid in their project. They believe that they can at least discourage it by setting assessment tasks in such a way that participants will be encouraged to support each other, rather than to compete against each other.

Although most people associate the word *apprenticeship* with learning situated in a traditional trade environment, lately [5][6] a concept of *cognitive apprenticeship* was introduced with the focus on cognitive skills and processes rather than on physical ones. However, the concept emphasises that knowledge must be used in practice e.g. for solving real-world problems and that expert knowledge is necessary, but not sufficient for expert performance. They also give a framework for cognitive apprenticeship and postulate four principles for designing effective learning environments: *content, method, sequencing and sociology* as summarised in Table 1 [6]. Although they are building blocks of any learning environment, and as such they are not new, when considered together, they give different dimensions to learning situations, to classrooms and to the roles of teachers and students [7].

Table 1: Principles of Designing Cognitive Apprenticeship Environments (adapted from [6]).

Content	Types of knowledge required for expertise	
	Domain knowledge	subject matter specific concepts, facts, and procedures
	Heuristic strategies	generally applicable techniques for accomplishing tasks
	Control strategies	general approaches for directing one's solution process
	Learning strategies	knowledge about how to learn new concepts, facts, and procedures
Method	Ways to promote the development of expertise	
	Modelling	teacher performs a task so students can observe
	Coaching	teacher observes and facilitates while students perform a task
	Scaffolding	teacher provides supports to help the student perform a task
	Articulation	teacher encourages students to verbalise their knowledge and thinking
	Reflection	teacher enables students to compare their performance with others
	Exploration	teacher invites students to pose and solve their own problems
Sequencing	Keys to ordering learning activities	
	Increasing complexity	meaningful tasks gradually increasing in difficulty
	Increasing diversity	practice in a variety of situations to emphasise broad application
	Global to local skills	focus on conceptualising the whole task before executing the parts
Sociology	Social characteristics of learning environments	
	Situated learning	students learn in the context of working on realistic tasks
	Community of practice	communication about different ways to accomplish meaningful tasks
	Intrinsic motivation	students set personal goals to seek skills and solutions
	Cooperation	students work together to accomplish their goals

In this project, the authors propose collaboration between students who are approximately at the same stage in their degree and, thus, should possess similar levels of discipline knowledge. Also, it is assumed that there was no previous intercultural communication training. Students' familiarity with technology is also assumed to be similar. In reality, a group of 2, 3 or 4 students may have quite different levels of discipline knowledge, technology based skills and intercultural experience.

It is unlikely that some students will only be in the centre of the *circle of participation* and others at the periphery. It is more likely that over time, participants will take various positions in the participation circle depending on their knowledge and skills, but also on their confidence in contributing knowledge and skills to the group depending on their personal and cultural differences. It is envisaged that less knowledgeable members will learn from the more skilled members, but it is not expected that the same student will always be in the centre and others at the periphery. Because the practice in this case includes various competencies, it is expected that the most knowledgeable/skilful student for a

given task/problem will actively step into the centre of the circle and will share his/her competences. For a different task, this student might move towards the periphery and another student, who has more knowledge of the new task, would step towards the centre. It is anticipated that over time, all members would generally make a shift towards the centre of the circle as they gain more competence and confidence through collaboration within their community.

Brown [8] points out that what is learned is very much linked to the condition in which it is learned and that *outsiders* become encultured through the process of participation in a community of practice [5]. Thus, the ultimate result is not expressed in terms of gained *objective knowledge*, but in terms of becoming an *insider* and attaining abilities to behave as community members. In this process, all community members shape their identity and change the community values and views.

In order for this to happen, it is important that students take an active role by stepping towards the centre of the circle to contribute their knowledge and skills. Not less important is the opportunity for members to take the position of LPP freely, which will allow them to observe the activities of practitioners (experts). However, they will do that only in a non-threatening environment. Wenger argues that *learning cannot be designed:* it can only be designed *for* – that is, facilitated or frustrated [4]. So, the authors see their task as trying to discover how best to support students in creation of a safe learning collaborative environment. Such an environment will encourage active dynamics in the community, which will maximise the participation of all members and consequently support their shift towards the centre of the participation circle during the life of the assignment, and ideally, beyond the life of the collaborative project.

The community of practice concept gives important insights into what learning is, how it occurs through collaborative interactions of community members, and the description of mechanisms that support learning. By adopting the community of practice concept as a well-developed theory of situated learning suitable for the context in which students involved in international on-line collaboration learn intercultural skills through interactions with each other, the authors are able to develop a framework that will support development of healthy dynamics of interactions within the groups in order to maximise the learning opportunities for students.

CHARACTERISTICS OF COMMUNITIES OF PRACTICE

A community of practice is not just a group of friends or a social network. It differs from other communities by its specific characteristics. The structural model of a community of practice is based on three fundamental elements: domain, community and practice [9].

- The *domain* is normally defined as a domain of knowledge, or more specifically a topic or a set of issues that community members are concerned with or a set of problems they are trying to solve. However, the authors do not see the domain as a static knowledge area with clear boundaries. The authors see it more as a structural element, which *creates common ground and a sense of common identity. A well-defined domain legitimises the community by affirming its purpose and value to members and other stakeholders. The domain inspires members to contribute and participate, guides their learning, and gives meaning to their actions* [9].

In this project, students have well defined tasks in the form of laboratory experiments in which they work collaboratively with students from another country. This usually involves solving problems, discussing issues related to the background theory and writing a joint report. However, students also know that the aim of this assignment is to gain international collaboration skill, including intercultural communication skills. Because they work and communicate in an on-line environment, they also need to develop certain technology related skills. In other words, their knowledge domain is multifaceted and boundaries are not clearly drawn. As such, it is a fertile ground for learning various skills some of which often have a form of tacit knowledge.

- The *community* is a group of people who care about the domain that a particular community of practice is based on. People are important as they *create the social fabric of learning. A strong community fosters interactions and relationships based on mutual respect and trust. It encourages a willingness to share ideas, expose one's ignorance, ask difficult questions, and listen carefully… Community is an important element because learning is a matter of belonging as well as an intellectual process, involving the heart as well as the head* [9].

In this project, the authors see each team of 2-5 students working together as one community of practice. Although they work on the same experiment and are expected to have similar discipline knowledge, their personalities will vary as well as their attitudes and cultural backgrounds. This will influence the behaviour of each member and consequently the dynamics of their participation. It is believed that there is no simple way in which students can be coached to be successful members of these communities of practice. In circumstances, where grouping is imposed on them, the lecturer has no control over how students will interact with each other. On the other hand, it is not sufficient to just make them aware of the importance of intercultural communication. They need more guidance. The authors believe that the guidance should focus on teaching them the fundamental principles of what a community of practice is and basic principles of creating a successful community of practice. This certainly includes motivating them to become active participants of their community of practice by teaching them the importance of wanting to become a member of a community of practice and the benefits they can expect from their participation.

- *The practice is a set of frameworks, ideas, tools, information, styles, language, stories, and documents that community members share. Whereas the domain denotes the topic the community focuses on, the practice is the specific knowledge the community develops, shares, and maintains* [9].

In this project, students are given certain documents with theoretical background and instructions on how to perform set experiments in a remote laboratory and guidance on how to use the on-line communication tools. They are given instructions on the initial steps on how to organise their collaborative work on experiments, and which tools they *can* use to accomplish their tasks. This means students are initiated and equipped with enough discipline knowledge and technical skills to complete their assignment successfully in an international on-line collaborative setting and to produce a joint report, which will be assessed. However, because of their different backgrounds, not only cultural, but also the variation in expertise in using different tools, e.g. on-line communication tools, word-processing, simulation and graphing tools, they will need to negotiate which tools to adopt and those not familiar with particular tools, will have an opportunity to learn new tools, as well as new ways of using tools they are familiar with. Depending on its composition, each group will develop different practices and tools to some extent. They will be adopting different words and phrases from each other through negotiating their meaning and, in such way, they will even develop their own language that will *work best* for the particular group.

To emphasise the intercultural side of the assignment, it is important to set tasks for students that will allow them to reflect on what they have learned and on differences in practices by students from different countries. The authors' experience from initial trials shows that students focus only on the technical problems and fail to take the advantage of meeting people from other countries to enrich their knowledge of different cultures and to observe the differences and similarities in their practices [10]. To encourage intercultural experience in the following trials, questions were embedded in the assignment, which aimed to shift students' focus from purely technical (engineering) tasks to various aspects of international collaboration and intercultural communication.

Table 2 lists a set of the questions that were introduced. It should be noted that this is only an example of questions and should not be taken as an exhaustive set or as a recommended set of questions. It is expected that each lecturer will be creative enough to set their own questions and even encourage students to recommend other relevant questions. However, it is suggested that at least some of the questions are related to the context of the professional domain in order to avoid diluting the professional and discipline context of the setting. In the example below, the questions posed relate to similarities and differences in programmes and courses that students do in different countries. Answers are not included as they can be found in a previous publication [11].

Table 2: Questions to encourage intercultural experience.

Q1	What have you learnt about the foreign country from this collaborative exercise?
Q2	What have you learned about programmes that your colleagues from foreign countries are doing (include differences and similarities)?
Q3	What have you learned about the course that your colleagues from foreign countries are doing (include differences and similarities in structure of the course, theory approach, simulation software used, etc)?
Q4	What is your perception of foreign partners' knowledge background (i.e. is it at a similar level as yours; if not, is it higher or lower, or in some areas higher and in others lower)?
Q5	Comment on cultural and behavioural differences that you have observed.
Q6	Do you think that your collaborative learning has been enriched by using different practices and knowledge?
Q7	List what you consider to be desirable attributes of an international group member.

COMMUNITY OF PRACTICE AND CONSTRUCTION OF IDENTITY

The community of practice concept focuses neither solely on the individual, nor on the community. Rather it explains how an individual and a community are interdependent and how the identity of an individual is constructed through his/her participation in practices of the community [12]. Here, identity is defined as the understanding of *self*. In his social theory of learning, Wenger argues that learning is not just acquiring knowledge, but it is also a process of understanding who we are [4]. On the other hand, this determines our participation, including various levels of participation in different communities of practice and consequently determines the communities of practice to which we belong, and are accepted. In other words, identity is reflected in, and constructed through our participation (including non-participation) in the communities of practice we belong to.

Wenger [4] introduces three different modes of belonging: engagement, imagination and alignment:

- *Engagement – through processes such as interactions, sharing practices and forming relationships, community members negotiate the meanings that matter to their community;*

- *Imagination – by creating images of possibilities, images of past and future, images of the world and images of themselves, community members extrapolate from their own experience;*
- *Alignment – through agreements, disagreements, compliances and discourses community members invest energy to coordinate their activities to fit within broader structures.*

Wenger represents the interrelationships between the *identity* of a person as a member of a community of practice *structure* and the *mode of belonging* in a diagrammatic form, as shown in Figure 1 [4]. It symbolises that identity is constructed though two complementary processes: identification and negotiability. Identification is seen as an investment of self in a community of practice through different modes of belonging. Negotiability is reflected in the degree of control over the meanings. As shown in Figure 1, both identification and negotiability can give rise to identities of participation or non-participation, e.g. if a person's opinion is continuously ignored, his/her engagement is marginalised and may result in developing an identity of non-participation. Examples of different modes of belonging are also presented in Figure1.

The diagram also shows identification, leading to different forms of membership and forming communities as their fundamental structure. It also shows negotiability, leading to ownership of meaning, which is interrelated with economies of meaning as a social structure of their relative values as some meanings may at certain time attain special status.

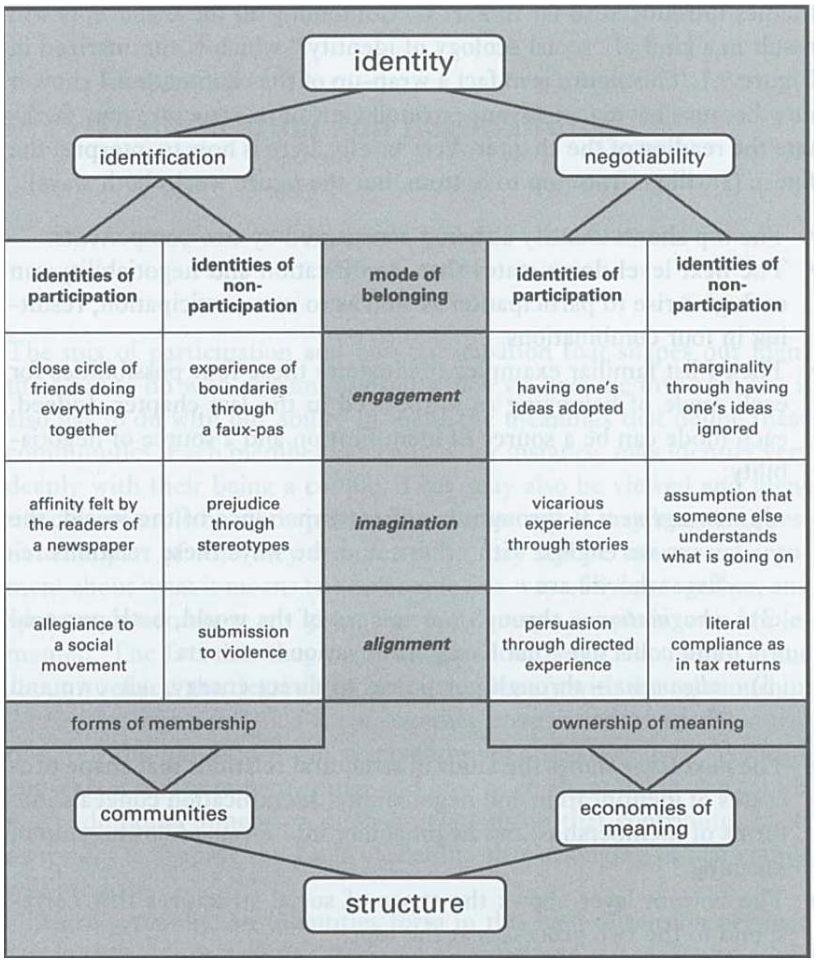

Figure 1: Social ecology of identity (Adapted from [4]).

This diagram was considered with interweaved dependencies of identity, participation, belonging and structure as an important background in understanding the social side of students' on-line collaboration. Although students do not focus on the social context of their collaboration in this project, the social context is probably the most important aspect of this collaboration as the primary objective of their collaboration on engineering experiments is developing intercultural capability. To be able to develop a framework that will support this type of learning, it is important to understand the social fabric of communities of practice as their fundamental organisational units.

Not being members of the collaborating students' teams, lecturers do not have control over processes taking place within the teams such as identification, negotiability, engagement, imagination, alignment and participation. However, through economies of meaning they have an opportunity to influence the dynamics of the teams externally. With properly designed assessment tasks they can encourage positive processes such as development of identities of participation through active engagement, and discourage negative ones, such as marginalisation. For that purpose, the assessment should value active participation through engagement, imagination and alignment by sharing knowledge

and experiences, but should not value ownership of meaning. Non-participation may be allowed and acceptable, perhaps by making the task voluntary, or one for bonus marks.

INSIDE LEADERSHIP AND OUTSIDE NURTURING

Communities of practice are self-organising systems, which can form spontaneously or through seeding and nurturing. However, they develop only through internal leadership. In this project, lecturers form groups. To support development in a relatively short time, the authors can only teach students about the importance and role of leadership inside the group and encourage members to take leadership roles by setting it as a task for each group to dedicate different leadership roles to different members. As defined by Wenger in the leadership roles that students need to take up are:

- *Inspirational leadership – to inspire the members;*
- *Day-to-day leadership – to organise activities;*
- *Classificatory leadership – to collect and organise information in order to document practices;*
- *Interpersonal leadership – to weave the social fabric;*
- *Boundary leadership – to connect the community to other communities;*
- *Institutional leadership – to maintain the links with lecturers;*
- *Cutting - edge leadership – to provide* out of the box *initiatives* [13].

Although these can be formal or informal roles, the authors prefer to ask students to assign all of these roles among the members formally. As there are usually more roles than students in a group in this project, each student will take up more than one role. They may divide these roles into two groups: major and minor; each student can be assigned one major, and one, two or no minor roles.

The group may also decide that some roles are not as relevant and may exclude them or substitute them with other roles. Providing students with this list and guidance on each leadership role will give them ideas about what is expected from them and may also inspire them to undertake more active roles in their community. It will also serve as a starting point in negotiating roles and reflecting on what each of the members' skills and aspirations are.

As lecturers cannot provide leadership from inside the communities, they should nurture the communities from the outside. Wenger gives examples of how organisations can nurture communities of practice from the outside [13]. The examples that the authors tried to apply in their project include:

- *Legitimising participation* – is the obvious one as this project already adopted the concept of communities of practice.
- *Negotiating their strategic context* – it is important that students understand how intercultural communication is related to their future profession. On the other hand, for lecturers it is important to pay attention to feedback from members of communities of practice related to strategic directions as this may be crucial in sustaining them in the future.
- *Being attuned to real practices* - properly design practice domain should be flexible enough to allow students to express themselves through participation as cultural entities. Still, it is important to be based on an engineering discipline task; otherwise students may not see it as relevant and may not take it seriously or may choose not to participate.
- *Fine-tuning the organisation* – although it is not easy to design a reward system that will manipulate students' behaviour, lecturers should design assessment schemes that reward students' participation and their contribution to creating positive learning environment.
- *Providing support* – communities of practice benefit when provided with relevant resources, such as: meeting facilities, help from external experts, communication technology, etc. In this project, students were provided with on-line access to remote laboratories that included video communication system. Lecturers were available to provide both on-line and off-line help with all issues related to the project, in particular, when students were not sure how to balance engineering content and intercultural content of the work.

Finally, lecturers should seed and nurture the development of communities, where students collaborate on-line with students from other countries, by providing resources and support, but should refrain from attempts to organise and manage them as they may hinder students' participation.

CONCLUSIONS

The concept of communities of practice and its fundamental characteristics is presented in this article. The authors also suggest reasons why this concept is suitable for situated learning of intercultural communication through international on-line collaboration, where students from different countries engage in engineering experiments in a remote laboratory. Rather than just having a Web page, where students chat and thus acquire factual knowledge about other cultures. An additional dimension into the activity was introduced by giving them an engineering task for which they needed to negotiate their engagement in professional activities. Consequently, this is not just a social engagement, but a kind of social engagement, which provides a suitable professional learning context. However, the authors are less

interested in the nature of formed relationships and flow of information, than in the practice created during the interaction process.

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BIOGRAPHIES

Zorica Nedic is currently a senior lecturer in electrical engineering at the University of South Australia (UniSA). She received her BSc in Engineering from the University of Belgrade, Serbia and ME and PhD from UniSA. Before starting her academic career, she worked for six years as an R&D Engineer at the Institute Mihajlo Pupin in Belgrade, Serbia. During her academic career, she has published some 100 refereed book chapters, journal papers and conference articles. Her work on the NetLab remote laboratory is well known Australia wide and internationally. Her research interests include modelling human vision, remote laboratories and technology applications in engineering education.

Andrew Nafalski's career includes assignments in academic and research institutions in Poland, Austria, Wales, Germany, France, Japan, USA, Canada and Australia. He holds BEng(Hons), Grad DipEd, MEng, PhD and DSc degrees. He is currently a Professor of Electrical Engineering at the University of South Australia in Adelaide. His major research interests are related to electromagnetism, remote laboratories and innovative methods in engineering education. He has published some 340 scholarly works in the above fields. He has been the leader of some 40 technical and educational research and development projects. He has received numerous national and international awards for excellence in research, teaching, engineering education and community service.