A Training Process for Faculty Members in Collaborative Degree Programs: Design, Implementation and Feedback

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Abstract

Collaborative degree programs in software engineering are becoming more common as universities try to expand their offering globally and leverage their knowledge and expertise. Faculty training program intended to help academics learn how to teach courses from collaborating institutions is a complicated undertaking considering the need to pass along course material, the 'spirit' of how the courses are taught and the quality standards to which they must adhere. Carnegie Mellon University developed a training process for teaching faculty members in its joint software engineering programs in India, Korea and Portugal. The process, its implementation and the feedback of using it with our overseas partners will be explored and described in detail.

1. Introduction

Global education is not just a matter of gathering material, using some web based learning tools and placing content on-line; due to its fundamental human nature, to be truly effective any global education initiative must be two-sided: global content and local delivery, adapted to the specificity of each educational market. At Carnegie Mellon we have observed that these two components and the balance between them serve as key elements in our strive to maintain quality programs that could be delivered overseas in a way that mimics their main campus counterpart.

In recent years, more and more universities establish collaborative academic programs using various models of delivery, course content and residency requirements in one or more locations [1]. Some of these programs include international collaborations where schools collaborate to provide a program that is highly reputable in one country and could enhance the domestic educational capabilities of the other. Regardless of the setup, most programs involving international collaborations face a daunting task of training faculty to work in a different environment, across geographies, cultures and time zones and to learn how to interact with different content, different student audiences and different ways of doing things. In the past six years, Carnegie Mellon University Master of Software Engineering Program (MSE) successfully established three such collaborations with ICU University in Korea, SSN University in India and University of Coimbra in Portugal. It is through those collaborations that we attempted to standardize existing training processes and work with our partner faculty to refine them to maintain consistent quality. The goal of this paper is to present one such process, pertaining to the training of foreign partner faculty, at Carnegie Mellon MSE program [2] to teach our courses in their homeland using our content, our methodologies and teaching techniques.

Section 2 of this paper will discuss common training mechanisms, how they fall short of what is needed and the difficulty of maintaining quality and of verifying the material has been learnt

and is being taught properly. Section 3 will provide a look at the process used at Carnegie Mellon University with greater detail and address various issues of implementation. Section 4 will provide feedback from existing partner faculty at the University of Coimbra, and section 5 and 6 will provide future recommendations for educators, universities, and a summary.

2. Existing faculty training practices

Most organizations look at training as either an ad-hoc event or an on the job (OTJ) practice [3] giving it little long term planning and thought. Some of the challenges in using training mechanisms in our academic context are the result of our typical understanding of the process itself, usually used for short skill enhancement or a 'fill in the gap'. If training of academic content and the faculty who teach it is to be replicable, consistent and quality focused, it must be thoroughly planned, thought out and designed in such a way that both trainer and trainee understand the process, its goals and how to get there.

Quite often, industry training practices are limited to class participation and examination. Unfortunately that merely provides a background in covering the material and making sure it was "memorized" as originally provided. What it lacks is the visibility into the aptitude of those being trained to actually apply the material in the context of their classes and the students within. Specifically, when programmatic level train-the-trainer processes are concerned, such as the case with Carnegie Mellon's collaborative academic programs, a primary goal must be that of maintain teaching quality and coherence and consistency among the offerings within the various campuses.

A good training process must therefore include built-in balanced mechanism to ensure effective learning and teaching quality. In essence, that means that the training faculty gets absorbed in the material, gets to understand not only how and what to teach but also how to apply it in various contexts and situations outside typical parameters. To do that, faculty in training must learn and be trusted to overcome natural barriers of immediately immersing themselves in applying and teaching new materials. They must also overcome a natural apprehension of providing critical feedback to training faculty on methods, techniques and the selection of the class material provided. Such a process must also provide a built in improvement component that should be used by all those involved to enhance existing practices, tailor specific steps to fit varying needs and successfully meet expectations.

3. Faculty training at Carnegie Mellon's MSE program

The need for a disciplined process for faculty training specifically for international collaborations might seem rather purposeful and intuitive, yet using a disciplined approach with global partner institutions is much more difficult to achieve [4]. For one, overcoming cultural and language barriers is challenging and each side is typically accustomed to a different way of doing things. Abiding by one side's approach to how to conduct such training creates what sometimes can be perceived as unnecessary change making 'buy in' on the other side for using a 'one sided' process a much more difficult sell. Fortunately, using a disciplined approach coupled with a clear upfront setting of goals and expectations typically negates this 'push-back' behavior from partner faculty and management. That plus an understanding that building flexibility into the process is provided so as to allow for tailoring of any given step to various partners' needs provide a good balanced approach. At Carnegie Mellon we have struggled to define a working process that could be easily replicated across the various collaborations we have with partner institutions in Korea, India and Portugal. The process, outlined in figure 1, and described below provides a way to synchronize the work across multiple levels, on one hand between mentor and training faculty,

between the mentor and the program and on the other, across collaborative programs with respect to what the training will include and how is it to be conducted.

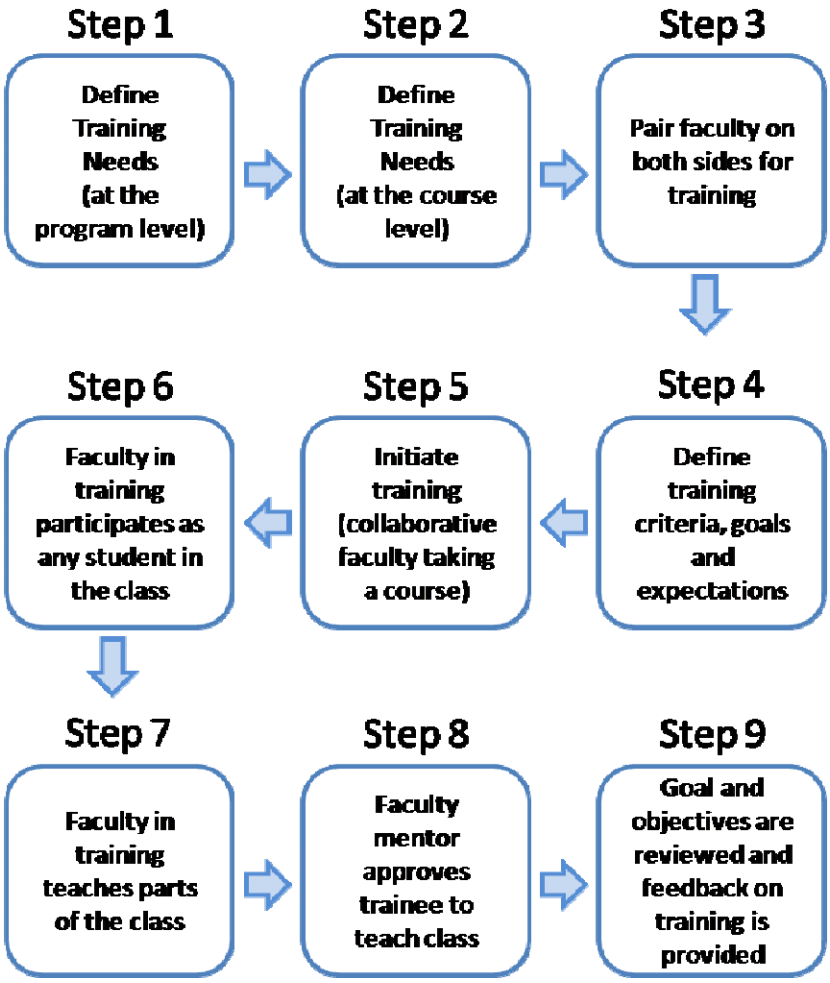

Figure 1: A Process for Faculty Training – Graphical View

The process outlined in figure 1 is broken into nine discrete steps:

Process Step #	Description
Define training needs (at the program level)	Program directors assess the training needs for the entire collaboration in light of the forthcoming interaction and working relationship with the collaborating institution.
Define training needs (at the course level)	Program directors and administrators specify interaction channels and provides suggestions on faculty assignments for specific courses. Skills/abilities of in-training faculty are reviewed to assure successful outcomes before pairing of trainer and trainee occurs.
Pair faculty on both sides for training	Program faculty on both sides are identified and paired up for the training. Schedules are reviewed to make sure faculty in training will get as much face time with the course faculty as possible.
Define training	Training details for specific courses are defined. These include

criteria, goals, objectives and expectations	classes to attend, grading responsibilities, topics to teach and other training activities. The criteria, goals, objectives, and expectations are clearly given to faculty in training.
Initiate training	The collative faculty may start by attending classes remotely, but eventually they move to the main campus. An overview of the whole program is presented, required and recommended readings for collaborating faculty and course contents are provided
Faculty in training participates in class	Collaborating Faculty participates in class as any other student and performs as specified before. This may include in-class participation, homework, and group assignments. Discussion occurs on course content, material selection, grading rationale and style.
Faculty in training teaches parts of the class	After attending classes for some weeks and becoming immersed in the material and teaching style, the collaborating Faculty teaches some classes. They can use existing resources and/or prepare other presentation material and suggested readings.
Faculty mentor approves trainee to teach class	As the course progress successful mentoring becomes a partnership. Intense communication is fundamental to overcome issues due to different cultures, teaching and grading styles. While approval to teach should be the normal outcome of a successful training, it is not guaranteed.
Goal and objectives are reviewed and feedback on training is provided	A reflection on the learning process after the course ends builds knowledge regarding the implementation of the process for the following faculty training. Trainer and trainee point out issues identified during the training as feedback on the whole process.

Table 1: Process Steps in Detail

4.1. Process Implementation

The process outlined above has been used by Carnegie Mellon University's MSE program in the past six years with varying degrees of success. Over the years, the steps outlined have helped ensure successful training occurs between collaborating faculty. Naturally, this process oriented approach is somewhat of a challenge when differing cultures are involved as is the case with our collaborative partners from India and Korea. It is not our desire to impose strict rules and regulations on our collaborating faculty but rather work with them to fine tune our process for the mutual benefit of our programs and to maintain the highest quality of education we all desire.

5. Process Feedback

5.1. Training at the Host Institution

From our experience and from that of others [5], collaborations require physical connections to be more effective. For us, this physical proximity becomes the most significant aspect of the whole training process and translates into having in-house training in the host institution (in this case Carnegie Mellon University). Its most apparent advantage is the easiness of interaction and availability of all faculty involved in the training. It makes it possible to discuss matters regarding the courses, the training status, how the grading and the evaluation of students is done, the fulfillment of the training objectives and so on. Being immersed in the culture of the host organization opens way to prevent a number of misunderstandings that are always possible in

multi-national cooperation. These collaborations may fail, not by lack of commitment or resources, but rather by the cultural differences between the involved institutions. Even in the experience described here, between institutions from the United States and Europe, who share a common cultural background some misunderstandings were clarified through many informal discussions.

The full availability of the visiting faculty due to relocation to the host institution also makes more effective the time available, due to the minimization of external interruptions from their parent institutions with respect to day-to-day activities they would normally handle back home. While those can't completely be avoided, they are to a large extent minimized.

Another side benefit of co-location is the opportunity for the visiting faculty to get involved in management activities such as faculty and staff meetings in their host institution. The insight with respect to the way the program and the host institution is managed has a dual benefit: it brings the people involved closer, facilitating further cooperation possibilities enhancing trust and camaraderie, and it provides a way for the visiting faculty to share their own experiences on things that can benefit and be applied at both institutions. In our particular example, management activities include things such as student evaluations in a "Black-Friday" format to studio Mid/End of semester Presentations [6], student mentoring, team mentoring and so on. Those could only be applied according with their original intent if visiting faculty have the opportunity to live it truly on-place. This know-how was found so useful that reports sent back to the visitor's institution led to the adoption of some of the practices in other programs besides the MSE. Furthermore, while the focus of the collaboration is on education, it can also be used to promote contacts for joint research activities.

5.2. Role of Visiting Faculty

Maybe the most important issue for this co-located training is to clearly define up-front the role of the visiting faculty. In this regard, that means setting clear expectations from day one for the outcomes from each course they are being trained on as well as providing the right context regarding which courses and what activities they should participate in. This decision must be driven by the major role the collaborating faculty will assume once the training is complete as well as by the need to build a cadre of instructors in the parent institution that can teach the curriculum and serve as backup for one another in times of need.

The role of the collaborating faculty take them some time to get used to: it is essential to guarantee and assess the visitor's expertise and delivery competence with respect to the course subject(s) and material(s). In our current collaboration, the visiting faculty attends classes as any other student including completing the assigned home and project work as part of the class, with exceptions but whenever possible. However, this approach may pose some problems. The visiting faculty, while acting as a student is not a regular student. They should be cautioned to not "interfere" too intensively with the class overpowering the discussions and answering all of the questions (because they can) so that it doesn't disturb its normal delivery. This problem is particularly acute in group assignments involving both students and the visiting faculty. There is always a tension between trying to do the assignment perfectly versus letting the students do the things they would normally do which can be somewhat unsettling for the visitor. The reasons are easy to understand: on one hand the visiting faculty should try not to bias the students' grades, by helping them obtain a better grade than they deserve; on the other hand, since they might not know exactly how they are being evaluated, they want to make the assignment as perfect as possible so that it appears they have a good understanding of the material.

5.3. Participation and Assessment

The visiting faculty's work as part of the training process should be directly discussed upfront with the host professor. Moreover, it is imperative that the visiting faculty be tasked with presenting some topics in the course that could then be used to assess his or her ability to deliver the course correctly. These class sessions can be recorded for later analysis and discussion, or for future training purposes. A potential problem to pay attention to, at this point, is that of maintaining consistency between the training requirements pertaining to each individual course. Some host faculty require trainees to actively participate in the course, teach some of the lectures, grade some of the homework and fully engage with the material. Others simply ask for class attendance with minimal work outside class. The level of granularity in each case might also depend on individual faculty's willingness to immerse themselves with the material, the training process and its possible outcomes, as well as their prior experience in the domain.

Involvement of the training faculty in grading exercises provides an ideal opportunity for tuning their understandings of the course purpose, course management and evaluation criteria. We would judge this to be one of the most important activities in building common ground and standardizing work practices and outcomes across different cultures and scientific backgrounds. Grading requires a close collaboration between hosting faculty and trainees, an openness of mind and availability to discuss, clarify interpretations, review and adapt practices as required by context.

Grading students provides extensive opportunities to discuss and clarify evaluation criteria and, in the process of doing so, to establish the relative importance of subject matters, the required understanding by students, the methods by which that understanding shall be judged, and the requirements for excellence. More than any other activity, competent student evaluation requires a strong shared understanding of course intent and a full knowledge of subject matter, to be able to distinguish performances and correlate them to probable learning outcomes. As such student evaluation can confidently be used as a basis to gauge trainee involvement, understanding and performance in their faculty role, by others or as a self-evaluation and self-orientation exercise.

5.4. Training Overhead

The advantages of co-location also have a considerable overhead: the financial cost, sending a faculty member abroad for a semester may impose additional effort on the parent institution's remaining staff. Related to that is the need to choose wisely the people that will receive the training, looking at long term program sustainability and the personal sacrifice they will be making if they are to be separated from their families and friends for that considerable period of time. Since the MSE program is organized into three four-month semesters, it is possible to schedule a training rotation for visiting faculty for only a semester rather than having them be away for a whole academic year. This also minimizes the negative impact it might have on any of their research activity. The training effort imposed on the resident (hosting) faculty is also an issue, but easier to manage as long as the visitors engage and can help with course grading and in-class lecturing as part of their training activities.

5.5. Course Consistency

Finally, the formal and informal channels for content synchronization should be defined as well as the policy on how and when such synchronization of the courses occurs. Specifically, when do courses get offered in various locations? What versions of the courses get adopted? (e.g. will the remote delivery use the syllabus and contents of the previous school year at the main campus or the current one)? When do new versions of the courses get updated and what is the

impact of that on the faculty training and their ability to handle new material being introduced? If courses are built on each other, will there be a single unified version in both campuses defined before the school year starts? Or will there be some version splits where changes in one campus do not propagate to the other side?

6. Future Recommendation

Following are some recommendations in specific categories that could help educators and program managers collaborate more effectively between organizations and pave the way to sustained success of such an effort:

6.1. Communications

From our experience a major recommendation is to communicate clearly from the outset the expectations from each party. There is no one ultimate cookie-cutter solution for all incoming faculty and courses, but nonetheless the whole process should be made explicit. The visiting faculty and their hosts must discuss the background of each course, the experience of the visiting faculty, and have an explicit agreement on how things should work from the get-go. Group assignments involving regular students and visiting faculty should be carefully considered. Maybe they should be avoided unless a specific relevant competence is required.

6.2. Focus and Flexibility

Various institutions might have faculty assume different roles, teaching, research or tenure track positions. In cases where there are teaching and research professors collaborating, there is a balancing act that should not be overlooked [7] and that might lead to potential problems. While for teaching faculty, the main focus is teaching, for research faculty teaching is seen as a burden and not a priority. Flexibility on the part of the resident teaching faculty is strongly recommended. Although visitors are co-located for the duration of the training, they may still be managing research projects in their home institution, finishing grading courses, and writing proposals for applying for funding. In some cases these commitments may conflict with some course assignments. The local host faculty should be flexible in managing those conflicts. This is a very important issue for visiting faculty since although they are there for training, it's very likely that they still have commitments on their side, either from projects, PhD students, courses or funding. It's important for visiting faculty to understand that there is some flexibility on the host side in terms of time management and deadlines on the assignments. For this collaboration, this worked out really well.

6.3. Support

Support stuff and their contribution on either side to make this a success should not be overlooked. These experienced personal work day in and day out to help solve or prevent the occurrence of problems. They make a difference in the visiting faculty feeling welcome, taking care of pre and post logistical issues and help alleviate any problems they might encounter from fixing a broken printer, to help finding a good day-care center for the faculty’s family. Having the relevant point of contacts identified beforehand helps move the collaboration forward. Since each institution is used to their own policies, guidelines and ways of doing things with respect to administration and the use of technology, coordinating this support, and having the support people on both sides, meet and establish a good working relationship is very valuable.

6.4. Preparation

For someone coming from the outside it may be hard to understand in which courses the students learn the different topics, the objectives of each course, and how the whole program is organized. In particular, it may be hard to understand what deliverables students have to produce and when. It may be useful for visiting faculty to be given such an overview, with the specifics, right when they arrive. It can be very useful to provide some sort of "essential reading list for visiting faculty" as well. Basically, a short list that covers the essentials needed to make them fully productive, a reading list with primary topics and one or two "readings" on each topic. If people already know the topic, they can naturally choose to skip the readings. If not, it would be clear what topics were important and where the information could be found. Even having just a list of essential topics can be very useful for the visiting faculty and a baseline for both parties.

7. Summary

In this paper we have described the faculty training process developed at Carnegie Mellon University for its collaborative degree programs in software engineering. The goals of passing not only course material but also the 'spirit' of how the courses are taught and the quality standards to which they must adhere are being successfully achieved. This was possible by up-font definition of program goals, course goals and individual training objectives, followed by co-located training and a reflective practice for continuous improvement. The fact that the topics presented are somewhat common on both sides of the Atlantic only attests to how global our world of software engineering is and further eases the communication and sharing of experiences.

A number of recommendations extracted first-hand from two years of collaboration with the involved partners was also presented. The fundamental issues are promoting an open-minded communication between different cultures, enhancing joint understanding, flexibility and practices supported by mutual respect. The cross-fertilization promoted by this experience is clearly a step forward in the globalization of education.

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