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IST (In-Service Training) Model to Improve English Teachers' Pedagogical and Professional Competencies in the Computer Science Department of Universities in Indonesian Context

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Abstract:
The fact that English teachers teaching in a computer science department may not really know detail about information technology (IT) as a subject, as well as its terminologies, brings about difficulties when deciding what kind of teaching materials are appropriate to the student's learning needs. Another issue is that some computer science teachers do not have an English language teaching background. This can be a drawback for this group of teachers since they do not really know how to teach the language. The following discussion is a needs analysis used as a preliminary study to develop an in-service training (IST) model to improve English teachers' pedagogical and professional competencies in a computer science department. Pedagogical knowledge, skill, and attitude, and professional competency became the core study since these two were the obvious difficulties faced by the two groups of teachers. This study involved English computer science teachers, the curriculum administrator, and the students in two private universities and one state university in Yogyakarta, Indonesia. Observations, open interviews, and questionnaires were used to gather the data.
***Keywords**: In-service training models, pedagogical competence, professional competence, andragogy*

1. INTRODUCTION

The Law of the Republic of Indonesia states that all Indonesian teachers should demonstrate four competencies, namely pedagogic, professional, personal, and social. According to that Law, pedagogical competency is the teacher's competences in managing the teaching and learning process, while professional competency includes teachers' mastery of the subject field. Personal competency refers to a teacher' steady, excellent, and wise personality so that they are able to be an effective role model for their students. Social competency is the teacher's competence in effectively and efficiently communicating and interacting with the students, other teachers, parents, and society. Among the four, pedagogical and professional competencies are seen as the core competencies since these two reflect the essential knowledge to teach and the teachers' knowledge of the subject (computer science). Higher education teachers/lecturers (*dosen* in Indonesian language*)* are supposed to master those competencies, as well.

Pedagogical and professional competencies are important in this study due to the fact that there are two groups of teachers teaching English to students of Indonesian computer science departments, English teachers who have an English language teaching (ELT) background (Group A) and English teachers who do not have ELT background (Group B), who very likely lack appropriate pedagogical and professional competencies. This is an issue in accordance with the Law of the Republic of Indonesia which states that lecturers have a duty to transform their knowledge and/or technologies to the students with respect to creating an engaging learning atmosphere, for the sake of the students' potential development. This responsibility is related to the pedagogical aspect of teaching. The professional aspect is reflected in the requirements that as a scientist, a lecturer is obliged to develop his/her knowledge and/or a technological competence through scientific logic and research, and disseminate it; it is also a must for a lecturer to produce (write) a module or a book, which can be published by either the university or other publications. The Indonesian government expects that these two requirements ensure that a lecturer should have the qualities of being pedagogically competent and professional. The fact that a teacher teaching an undergraduate program must, at least, hold a master degree is also used as a measurement that the teacher has been professional. However, as can be seen later in this document, both groups of teachers are lacking in some aspects of being professional, such as they may never produce a module or materials used in their class, and may not exhibit pedagogical skills, such as the skill to motivate unmotivated students and achieve appropriate classroom behavior management. The interviews conducted in this study show that some teachers did not produce teaching material and didn't know how to motivate the computer science students, who, according to the teachers, thought that English was not important to them. This paper presents a model intended to improve computer science teachers' professional and pedagogical competencies for the sake of the computer science students' English learning growth.

Indonesian students have formally learned English since they were in middle school, so generally they have been learning English for 6 years before they continue to

their higher education degree. In addition to the fact that they have studied English for quite a long time, the policy of the Department of Education and Culture of the Republic of Indonesia states that English may even be taught earlier, started from elementary school, so it has been one of the extracurricular subjects in almost every elementary school in Indonesia. These provisions, however, do not guarantee that the English mastery of the students passing their high school level test is enough to meet the minimum requirement of English skill needed at the higher education level. It consequently requires higher education teachers to be creative in improving the standard of English necessary for the higher education students.

Poor English language competency is seen as a barrier to increasing the higher education graduates qualifications in the work force. Based on a Trends in Skills Demand, Gaps, and Supply in Indonesia report written by the World Bank Human Development Department, East Asia and Pacific Region, it is stated that "The widest gaps across professional profiles are for English and computer skills followed by thinking and behavioral skills. Gaps in computer and English skills are likely to be more felt in export and technologically oriented sectors and sub-sectors" (p. 85). This document, further states that there are important gaps in creativity, computing and some technical skills for young workers, but English remains the largest gap."While English may not be considered that relevant it is however perceived as the most serious gap (and by younger and older workers alike), matching employers' perceptions." (p. 93)

Another research finding concerning the low level of English skills of higher education graduates in Indonesia is also acknowledged in a study conducted by Baso (2014). In the conclusion Baso wrote that the gap between higher education's preparation of students English language skills (in East Kalimantan, Indonesia) and companies' English language requirements should be addressed as needed. Furthermore she suggested that additional English programs such as TOEFL preparation should be incorporated into the curriculum at university level. English for Specific Purposes, emphasizing the demands of the users (companies), should be kept up to date, and was considered as a very important necessity for higher education students. The evidence quoted above suggests that the need for professional higher education teachers teaching English for Specific Purposes, in this case for Computer Science, is very important.

2. Teachers' Pedagogical and Professional Competencies

Teachers often think that advanced training courses help them in choosing the most advanced methodology in ELT. Anderson (2016), nevertheless, found out that it was arguably incorrect when the methodology was being context-specified, meaning that it had a different result if it was applied in different situation and condition. One of the participants' comments in Anderson's research mentioned that he/she decided to use all the knowledge he/she learnt on the course in his/her lessons of English. He/she found that the students began to complain and leave the group saying that his/her lessons are too complicated and they didn't understand anything.

Regarding the fact that what pre-service teachers have learnt in the teacher training departments may not match the demands of real teaching situations raises some questions about whether they need follow up training after they finish their pre-service training. Rochsantiningsih (2004) noted that pre-service training was usually designed by the authority or professional development providers. Some teachers, she argued, reported that the material presented in the training was not always appropriate nor had direct application in the real classroom. When teachers faced real classroom conditions, they relied on their own perceptions of its significance or importance. Teachers often found out that they were quite confused about their roles in teaching following the training.

Richards and Rodgers (2002) argue that language teachers' roles are to facilitate the communicative process between the students in the classroom, with various communicative activities conducted during the lessons. A teacher should act as an independent participant, as well. Teachers are required to organize, lead, and monitor the learning process. To do this, Richards (1998) suggests that six factors are required to build the skills and competences of teachers. These are: 1) teaching theory; 2) teaching skills; 3) communication; 4) subject matter knowledge; 5) pedagogical reasoning and decision making; and 6) contextual knowledge.

Nine teaching skills are identified as the main competence for teachers. These teaching skills consist of the following: 1) selecting learning activities; 2) preparing students for new learning; 3) presenting learning activities; 4) asking questions; 5) checking students' understanding; 6) providing opportunities for practice of new items; 7) monitoring students' learning; 8) giving feedback on student learning; and 9) reviewing and re-teaching when necessary (Richards, 1998). Other researchers list more skills required for language teachers. For instance, Rochsantiningsih, (2004) lists: 1) preparation of communicative activities; 2) organization and facilitation of communicative interaction; 3) judgment of proper balance between fluency and accuracy; 4) awareness of learners' errors; and 5) appropriate treatment errors.

Referring to what Richard and Rochsantiningsih have argued about the skills and competences required for effective language teaching, the computer science English teachers from non-English education background need to improve the nine main competences for teachers; whereas the teachers who do not have deep subject matter knowledge need help from their colleagues who have better mastery of computer science terminologies. Therefore this combination of needs suggests very specific training needed for both group of teachers.

3. RESEARCH METHODLOGY

Needs analysis is a very important first step in developing a model. One emerging research design in developing model, design-based research (DBR), is among many other research designs that put needs analysis as its firts step (McKenney and Reeves, 2012). The needs analysis includes problem identification and diagnosis. Needs analysis, according to Brown (1995: 36) is "*the systematic collection and analysis of all subjective and objective information necessary to define and validate*

defensible curriculum purposes that satisfy the language learning requirements of students within the context of particular institutions that influence the learning and teaching situation".

The grand design of this research is DBR as depicted in Figure 1.

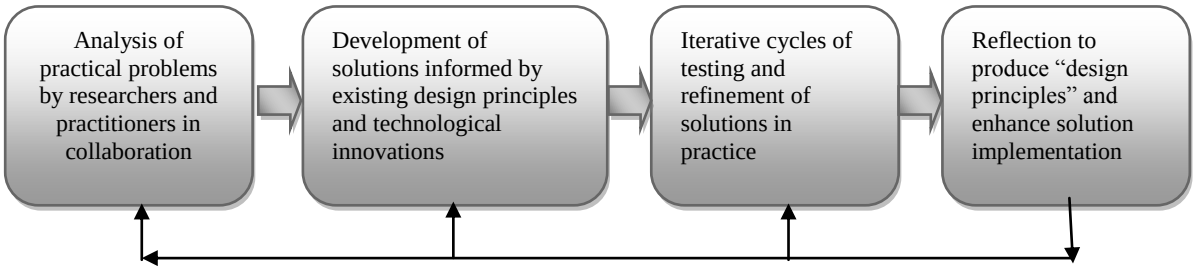


Figure 1: Refinement of Problems, Solutions Methods and Design Principles (Reeves, 2000, 2006)

4. FINDINGS

4.1 Informatics Students and Their Wants and Needs

During five years of teaching English to computer science students, this author always asked the students to write a short essay about their expectations and their learning goals in taking English for computer science. Using this rich data as a preliminary study would not be complete if the following considerations are not included, such as the expectations of the faculty in prescribing the curriculum and the expectations of the employers, who will later employ the graduates. The former will be discussed while the latter will be the subject of follow up research.

The followings are some examples of student teacher's expectations about the subject English for computer science (student comments have not been edited). The reader will note evidence of the issues regarding higher education students' English competence as mentioned above:

- Currently English is a global language, especially in the field of information technology. So, in this class I want to learn how to read and understand the English language books quickly and efficiently. Especially books related to information technology. …
- …For my future, I will do my best to learn English well. I'll make English as my habit and bring it in my daily life such as reading the English books…
- …One of the reasons i took this course is i want to get some english practice where i can keep my english competence. When i didn't used my english in some period of time, my english competence will gradually disappear. I thought to achieve this litle goals is quite easy, just be diligent in class, always pay attention to all of the presented material which will be presented by the lecturer or my classmates, do all the task that given in the class, and took the english to be one of my habits….
- I believe in learning through practicing and experiencing continually. Taking BII class is a way to both practicing and experiencing English in the real time, so I can learn more and more to sharpen my skill in English. I want to improve my skill in conversation, writing, grammar, reading, and add some

> new and important vocabularies. Also, I think taking BII class will help me to prepare the TOEFL test to prove that my cognitive in English

The above expectations could be taken as the students learning goals. It can be seen that they have a limited understanding of their needs in learning English, which is one of the compulsory subjects in the curriculum of computer science departments. Some of them take the subject merely because they must; some others think that taking the subject will help them to do any English test, such as TOEFL.

To get to know more about their needs, this author distributed a questionnaire asking what English skills were important for them as computer science students. A total of 50 questionnaires were distributed to three different groups of students, but only 29 (58%) were returned. The result of the questionnaire shows that the highest percentage (83%) considered English speaking was the most useful skill for their career after finishing their study. When they were asked what English skill was needed to support their study, 45% answered reading skill and another 41% said writing skill. Figure 1 shows the IT students' English skill's preference.

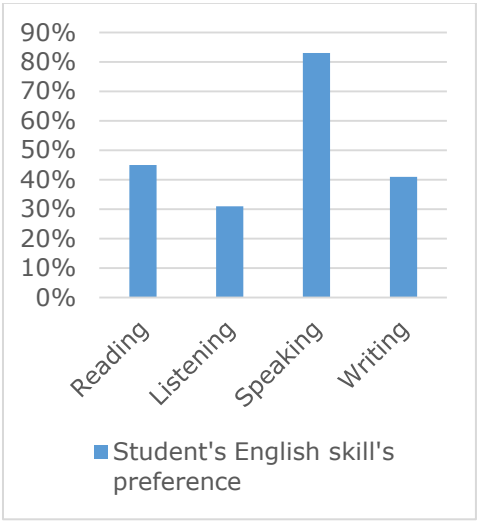


Figure 2: IT students' English skill's preferences

4.2 Teachers' Challenge in Teaching English for Computer Science

Four English teachers from different universities, who had taught English for computer science students for 5 to 10 years, were interviewed. One of them was a non-ELT (English language teaching) background teacher. They were asked, what was the biggest challenge in teaching English to students of computer science? Two teachers said that even though the subject was a compulsory one, most of the students were not well motivated since, as said by the teachers, they had not been able to find the use of English at the moment they were taking the English subject, as one of the compulsory subjects in the computer science department curriculum. This is understandable since English is a foreign language in Indonesia, so there are few opportunities to be exposure to English, meaning that English is not widely used and evident in the daily life of the Indonesian students. Therefore most of

Indonesian students are not yet able to understand the importance of learning English.

The term English as a foreign language used in this paper, is different from the term English as a second language, as Krashen (1991) argues that

> First language influence may thus be an indicator of low acquisition, or the result of the performer attempting to produce before having acquired enough of the target language. It is, not surprisingly, found most often in foreign language, as opposed to second language situations, where opportunities for real communication are fewer, and is only rarely seen in "natural" child second language acquisition.

In line with Krashen's argument, English in Indonesia is a foreign language, since opportunities for real communication in English are fewer, and only rarely occur. The most important issue here is the lack of every day English communication, in comparison with neighboring countries such as Singapore and Malaysia where English is used in daily communication as another language side by side with the first language. Thus exposure to daily English is not as easily provided to the Indonesian students learning English, and sometimes almost impossible.

An informal spoken English language environment is not easy to find in Indonesian daily life. Although, as an international language, one can find English discourse everywhere, such as signs, advertisements, news, announcements, both in the written and oral forms and in paper-based and electronic-based forms, still finding real situations which can support English learners to experience real, everyday communication in English is not an easy task. To practice their English in these circumstances, students need an artificially nurtured environment, such as practicing with peers and having an English club (covering all English skills: reading, writing, listening, and speaking). Another issue that may have impacted on the responses to this research concerns the location of the research in Yogyakarta. One of the lecturers interviewed said, "Yogyakarta, unlike other metropolitan cities in Indonesia such as Jakarta and Surabaya, does not give enough chances to expose English. Based on research, students from big cities are more confident to communicate in English than those coming from suburban area like Yogyakarta".

In the classroom, one of the most important tasks of the teacher is to give learners enough exposure to examples of language in different contexts, and from different speakers. As a competent speaker of the language, the teacher themselves can provide useful examples of language, and can also use natural input from cassettes, television, video, web sites, magazines, and books, such as those provided by the British Council. All activities given and created by both teachers and learners in the classroom context are considered as formal (in-class) exposures in English. Given the lack of naturalistic opportunities to use English, effective formal teaching methodologies which will strengthen students' exposure in English in the class, are therefore very important in the context of the English teaching and learning process.

Concerning the unmotivated students, one of the lecturers' responses (Group B) is interesting since it shows that he did not really understand the value of effective pedagogical strategies. He said that his efforts with pedagogy skills were not useful,

as he mentioned, "It is a classical problem, English is a compulsory subject for IT students, and thus they just think that they need it(only for the sake of getting score). They do not really find the immediate benefit of taking it. Therefore applying any pedagogical skills in the class is most of the time useless". His answer was, however, very different with the experience of the English lecturer from the state university (Group A). She said that teaching ESP (English for Specific Purposes) to computer science students was a bit easier than teaching general English because, as stated by the teacher, the students needed it for their future work, meaning that ESP is useful to prepare the students to seek for a better job.

Unexpected findings were discovered in the answers to the question about the emphasis on the subject of English. This study found out that every department in the different universities involved specified different objectives for the output of English for computer science students. Even the teaching focus used by two lecturers teaching the same subject in the same university was not the same. The teaching emphasis of the lecturers who found students to be unmotivated was on reading while the other lecturer with the motivated students emphasized improving the students speaking and vocabulary mastery.

Another unexpected finding concerned the syllabus. Only one out of the four lecturers interviewed had a syllabus, as well as the materials or modules, for the English class. "There is no syllabus of ESP, but a syllabus for General English. But each teacher made their own syllabus. Mine was mostly specified for improving conversation and vocabulary only. Sometimes I applied for ESP, and they enjoyed." said one of them.

Another challenge encountered by one of the teachers was the big number of students in one class. Both in the private and state university, there were about 35-40 computer science students in one class. However, the other three teachers stated they did not find difficulties dealing with managing the students in the large class. Definition of a large class varies. Ur (2009) argues that a class with 40-45 students is considered large, while also admitting that in some places numbers may rise to the hundreds. In addition Ur (ibid) states that "A study done by the team of the Lancaster-Leeds(*Project Report No. 4 of Coleman et al., 1989*) indicates that an average perception of the large class may be around 50 students." (p. 302). For some Indonesian teachers being interviewed, Ur's definition of a large class, which is between 40 to 45 students, tallied with their own experience. Again, the definition is subject to differ according to the condition of each class. The author's experience in teaching language skills, where the emphasis was on communicative methods, was that the smaller the number of students, the better the result will be. A number of 10-15 students is ideal; however the limit of up to 25 students is still acceptable in a speaking class, for instance.

5. DISCUSSION

5.1 Suggested In-Service Training Model for English Teachers in a Computer Science Department

The table below summarizes the English learning needs of Indonesian computer science department students and the challenging situation for English lecturers, as

stated by the teachers surveyed. This information is accompanied by the implications for education and the economy of ineffective English lecturers. This, together with the pedagogical and professional competences needed by the English lecturers will be used as the basis for designing a model of in-service training (IST Model). Figure 2 summarizes the needs of the IT students and the employers, the teaching emphasis, and the challenges faced by the lecturers.

Table 1: Summary of Reported Needs

Students' needs in rank order from highest to lowest	**Lecturer's Teaching Emphasis**	**Report on Customers' needs**	**English lecturers' stated challenges**
1. Speaking	1. Reading	1. Speaking	Unmotivated students
2. Reading	2. Writing	2. Writing	Exposure in real life
3. Listening	3. Speaking		Big number of students
4. Writing			Compiling appropriate materials
5. Presenting ideas			
6. Computer science vocabulary/terminologies			

The in-service training model developed as a result of this study is intended for use by the English lecturers so that they will, at the same time of being trained, implement the activities during their training. Thus, an action research approach will be applied while the lecturers are in training.

The participants of the in-service training model will be higher education teachers, meaning that they are adult learners. Therefore the strategies utilized should be connected with research about how adults learn effectively. The four thoughts of adult learners (andragogy) suggested by Knowles (2005) will therefore be used as the principles for designing this IST model. These four thoughts are 1) adults need to be involved in the planning and evaluation of their instruction, 2) experience (including mistakes) provides the basis for the learning activities, 3) adults are most interested in learning subjects that have immediate relevance and impact to their job or personal life, and 4) adult learning is problem-centered rather than content-oriented. In practise, the principles of andragogy mean that any instruction for adults need to be more focused on the process and less on the material being taught, therefore andragogical teaching needs to utilise strategies such as case studies, role playing, self-evaluation, project based, and simulations.

Following the emphasis of the IST model, which focuses on the process, the theory of reflective learning is used as another foundation for this model. Reflective learning is suitable since it seeks to develop students' capacities (in this case the capacities of the higher education lecturers) to enhance their learning and professional practice (Ryan & Ryan, 2013). In relation to the professional practice of the lecturers, Moon (2006) suggests that professional reflection mostly includes a conscious and stated purpose and it is usually linked to professional development (PD).Ryan (2011) wrote that professional or academic reflection is not intuitive; it requires specific pedagogic involvement to be executed.

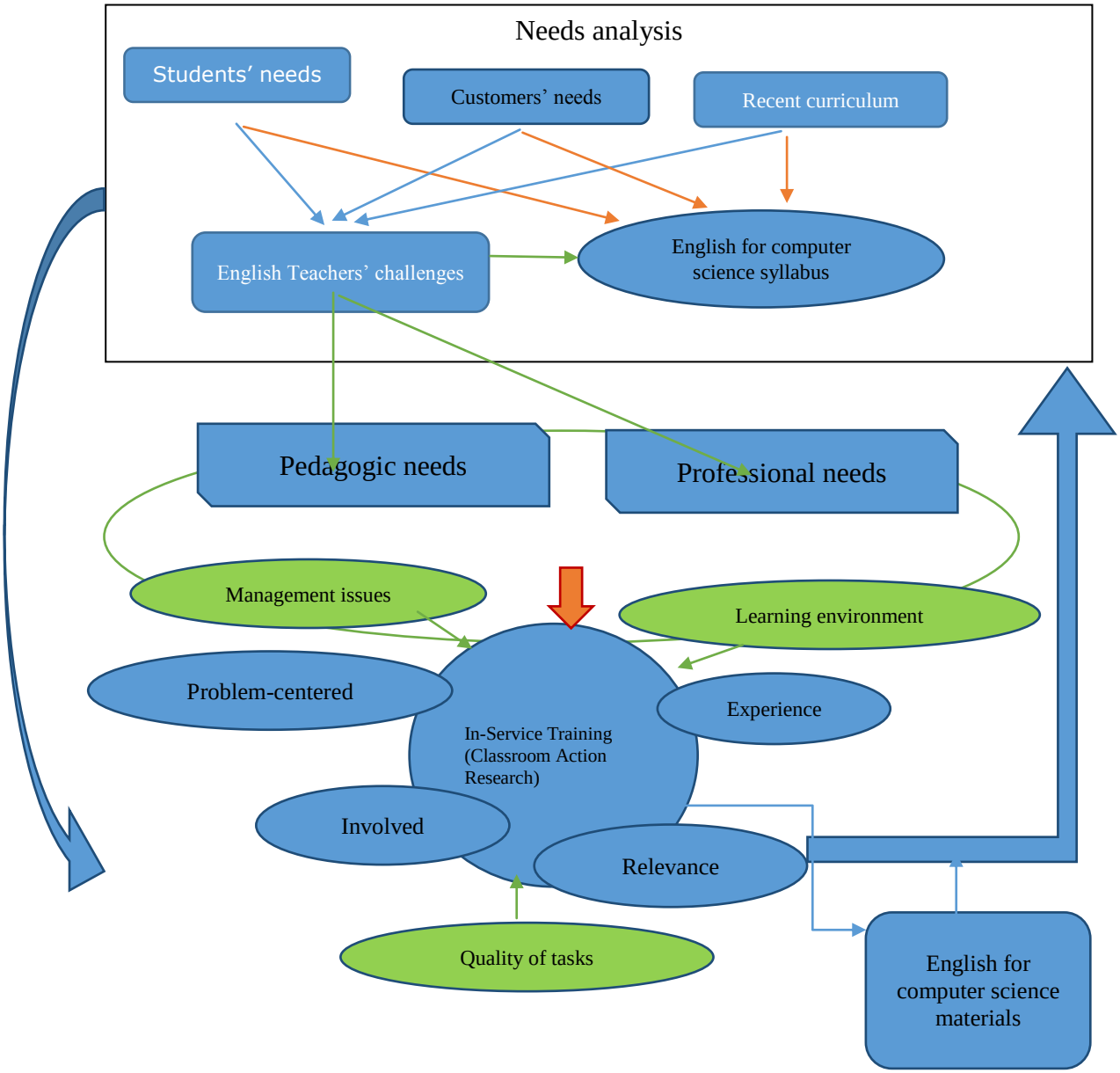
The reflection, however, needs some conditions in order to be executed effectively. Moon (2004) argues that there are three conditions needed to promote reflection. They are the learning environment, management issues, and the quality of tasks that encourage reflection. Something that should be kept in mind regarding the learning environment is that "the significant aspects of the environment are those perceived by the learner, and these may be quite different from those perceived to be important by an observer" (Moon, 2004: 165). They need time and chances to reflect and to learn to reflect respectively. They need facilitators of reflection, as well. The supporting institutional environment and an environment that is emotionally supportive are other essential considerations for this model.

The second condition which, according to Moon (2004) will influence the students' reflections is management issues. These include the purpose and outcome of reflection, strategies for guiding reflection, the dangers of adherence to recipes for reflection, the issue of public and private material in reflection, group or individual work on reflection, understanding of the different states of epistemological understanding, help for learners in learning to reflect, a curriculum that encourages reflection, and mechanisms to facilitate the transfer of habits of reflection. The last condition which is very important regarding the pedagogical aspect of adult learning is the qualities of the tasks that encourage reflection. The task may use activities, which will expose the students more to the learning objectives. It also needs to ask the appropriate kinds of questions that can encourage reflection. Another strategy for promoting reflection can be setting challenging tasks that encourage learners to integrate new learning into previous learning. The tasks should also help students to learn to order their thoughts and develops kills in evaluation.

5.2 Why in-service?

In-service training is appropriate in this model due to the fact that the needs of the English lecturers, as well as the students, in different departments are different. This is another unexpected finding since there is no standard ensuring that the students will get almost the same curriculum when they are taking computer science major, even in different institution. The Indonesian government has produced a national standard for higher education that relates to this problem. This national standard states the minimum criteria for higher education in Indonesia, and includes standards of students' achievement, instructional content, instructional process, instructional assessment, teachers and administrators, infrastructures, instructional management, and instructional costs.

Even though the standards for higher education have been specified, each study program in a higher education institution has its own interpretation based on the needs of its students. This results in different needs among different study programs in different institutions. Therefore differentiated in-service based on student needs is the most appropriate training in order to improve the qualities of the pedagogic and professional developments of the English teachers. The model is shown in the following diagram.



The diagram demonstrates that the model is a cycle, which begins with the needs analysis. The analysis includes all components needed for prospective computer science graduates, namely the needs of the students and customers, and the recent curriculum. These three are reflected in the syllabus created by the teachers, and at the same time create the challenges of the teachers to implement it.

From the result of the preliminary research, it was found that computer science English teachers needed to develop their pedagogical and professional competencies. Therefore these two competencies are improved throughout the in-service training, which is built based on the reflective learning and andragogic theories. Reflective learning is appropriate considering that the teachers have experienced in teaching English for quite some years. Thus they are expected to be able to reflect what they have done in the classes before the training. These include

management issues, learning environment, and quality of the tasks. The four principles of andragogy will strengthened the model, as well. They are problem-centered, experience, involved, and relevance.

The IST model should be implemented during a whole semester. During the training the teachers are also expected to teach the subject in the computer science department to directly apply what they get in the training. Classroom based action research is done in the training to revise the IST model. Class discussion about the action research is utilized as the vehicle to produce better and suitable English for computer science teaching materials based on the teachers' reflection during their own teaching during the semester.

The four important competencies that should be mastered by all teachers (in Indonesia) are pedagogic, personal, social, and professional. They should also be mastered by an English lecturer in a higher education institution. Among those four, pedagogic and professional competencies seem to become the most urgent needs for teacher in-service development. This is in accordance with the situation in the real world where this research has identified major issues. This approach will help remedy the pedagogical and professional competencies of both groups of teachers

The needs analysis conducted in this study shows that the students thought they needed skills in speaking and writing, while based on interviews with English teachers, many teachers emphasized reading more, although some were emphasizing speaking and writing. The employers of the computer science graduates, however, looked for IT students with good proficiency in English, particularly everyday speaking skills. English teachers consequently need to adjust their syllabus and materials to meet the demand from the employers. Since the teachers have been teaching English to computer science students for quite some time (5-10 years), they need training that also accommodates their experience in teaching. Thus the most appropriate method is by designing in-service reflective training, which will help them see the gap between what they have been doing and the real student needs.

6. CONCLUSION

The IST model is intended to use all the information from the needs analysis to create an appropriate cycle of training. The training will include reflection which can result in helping the teachers to design more appropriate English for computer science students' instructional materials during the training program. Although follow up action research of this IST model is still needed to define the detail of the most appropriate strategies to train both groups of English teachers in computer science department of universities, it is still to be completed. However it is expected that the IST model will help English teachers of computer science to improve their pedagogical and professional competencies in line with computer science students' needs. The IST model is expected to help close the gap between the existing teachers' pedagogy and the needs of the students of computer science department in learning English in Indonesia, where English acts as a foreign language. The author believes that better teachers will generate better results in both education and the economy.

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