NEEDS ANALYSIS-BASED APPROACHES TO ENGLISH LANGUAGE TEACHING FOR SCIENCE STUDENTS

Muhamad Hasbi
IAIN Salatiga
muhamadhasbi.official@gmail.com

Abstract
Teaching English to science students can be a lot more challenging compared to teaching it to English students due to the more basic but complex issues such as student motivation and perspective toward English learning which must be dealt with strategic approaches. This reflective study explored the use of needs analysis-based pedagogical approaches to teaching English to students of Science Education Department, IAIN Salatiga in the first semester of the academic year of 2016/2017. (1) Needs analysis form covering student attitude, choice of topic, and choice of types of learning activities, (2) direct classroom observation and (3) student post course evaluation sheet were in use to gather the data which later was analyzed quantitatively. The research found that, in an ESP class, conducting student needs analysis was paramount prior to designing pedagogical activities and had a significant contribution in the lesson plan decision-making with strong efficiency relevance in its learning application as student evaluation concluded with a high rated score.

Keywords: English for science, needs analysis, approach

Abstrak
Mengajarkan Bahasa Inggris kepada mahasiwa jurusan Ilmu Pengetahuan Alam (IPA) dapat menjadi jauh menantang dibandingkan mengajarkannya kepada mahasiswa jurusan Pendidikan Bahasa Inggris dikarenakan hal-hal dasar namun kompleks semisal isu motivasi belajar dan cara pandang mereka terhadap pembelajaran Bahasa Inggris yang harus ditangani menggunakan pendekatan-pendekatan strategis. Penelitian reflektif ini mengeksplorasi pengunaan pendekatan-pendekatan
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pengajaran Bahasa Inggris berbasis analisa kebutuhan (*need analysis*) pada mahasiswa semester pertama jurusan Tadris IPA, pada tahun akademik 2016/2017. (1) Daftar analisa kebutuhan yang mencakup sikap, pilihan topik, dan pilihan jenis aktifitas pembelajaran, (2) pengamatan kelas, dan (3) lembar evaluasi mahasiswa paska perkuliah an digunakan untuk mengumpulkan data yang selanjutnya dianalisa secara kuantitatif. Hasil menunjukkan bahwa dalam kelas English for Specific Purposes (ESP), mengadakan analisa kebutuhan mahasiswa sangatlah penting sebelum membuat desain pembelajaran dan memiliki kontribusi yang signifikan dalam membuat keputusan dalam perencanaan pembelajaran dengan tingkat efisiensi yang relevan dalam aplikasi pembelajaran sebagai mana evaluasi dari mahasiswa menunjukkan nilai dengan rating tinggi.

*Kata kunci:* Bahasa inggris untuk IPA, analisa kebutuhan, pendekatan

A. Introduction

The discussion on the necessity and the significance to English learners of learning and getting familiarized with the comprehension of general science has always been on board since long (Laplante, 1997; Giouroukakis, Rauch, 2010; Ferreira, 2011). This is easily not a baseless theory; in fact, it is very pivotal to be brought in the pedagogical practices since English learning is not a closed field of study limited to the area of language only, rather a means to interconnect all subject matters as it carries meaning and incites understanding. While there is no more debate on that matter, for the learners themselves the process is rather filled with obstacles such as the lack of academic language. According to Cummins (in Giouroukakis, 2010: 51), it takes ELLs only 1 to 2 years to acquire conversational language (Basic Interpersonal Communication Skills or BICS), but 5 to 7 years to acquire academic language (Cognitive Academic Language Proficiency or CALP) that would assist them in comprehending content-specific texts; it may take them even longer to learn the technical vocabulary of science, which is specialized and requires advanced levels of literacy. He went on recommending
carrying out activities such as classroom demonstration, discrepant events, and small-group work with considering multimodalities aspect so that they learn faster and better (Giouroukakis, 2010: 52-55).

Vice versa, science students need universal language(s) to expose their insight to broader audience so that their contribution to human civilization becomes more impactful. This marks the notion of English language learning for science students as mandatory. Here is where the discussion of English for Specific Purposes (ESP), teaching and learning English as a second or foreign language for the purpose of using it in a particular domain (Otilia, 2015), took place. As suggested by its name, ESP targets on specific subject-related learning outcomes. Unlike the English lesson of students who major in English education, ESP must make sure that all learning processes experienced by the students must also support their professional development in the later use. According to Ono and Morimura (in Mursikhin, 2016: 29), the first two set of skills within an ESP course that is important to be acquired by learners is an English proficiency which will allow them to communicate with English-speaking specialists all over the world, a cosmopolitan, global outlook, and experiences which will enable them to communicate with other nations on equal terms outside their own country.

ESP courses often stand alone without a curriculum-wide program of ESP or a resource-rich university center with an English language faculty specialized in this field (Porcaro, p. 32, 2013). Therefore, development after development within an ESP course syllabus or teaching approaches in general is strongly encouraged. Most English teaching experts recommend conducting a needs analysis prior to giving an ESP learners a course as it is is the foundation on which we can develop curriculum content, teaching materials and methods that can lead to increasing the learners’ motivation and success (Otilia, 2015: 45). Therefore, this study on needs analysis based approaches to teaching English for science students was conducted. This study shared the concept of that of Mursikhin (2016) where he attested the significance of a needs analysis impact on manual development where alterations were made on the original manual referring to the needs analysis result.
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This research, however, was rather distinctive, that after making some changes on the course syllabus it went further with the observation on pedagogical activities and collecting student evaluation to extract feedback on its efficiency to achieve learning goals seen from student perspective.

The subject of the study was students of Science Education Department, IAIN Salatiga, undertaking English 1 course in the odd semester of the academic year 2016/2017. Phase I: This study began with handing out a needs analysis form to students to fill in the first meeting. This method was preferred to conducting a pre-test since this was an English for Specific Purposes (ESP) class where students did not attend with the supposedly similar and high degree of motivation like the case of those majoring in the English department. The need analysis form was to inquire (1) student attitude toward English learning before the course targeted to look for detail information on how much they like (fondness), are able to (ability), are afraid of (anxiety), and is willing to learn (willingness) English measured from their own perspectives; (2) student preference of the theme of materials, i.e., whether science-related or general topics; and (3) student preference of types of activities whether in the form of presentation, discussion, drama, quiz, handbook-based, song-based, film/video-based, and game-based). The form did not only let students write numerical (inquiry 1 and 2) or priority rearrangement (inquiry 3) answers but also provided some blank spaces to write in order to enable students to add some explanations to some points if it was thought necessary. All those answers were rescaled into an average total percentage, whereas verbal comments or explanations were to support or clarify the analysis as reported below in the discussion section.

Phase II: Teacher adopted the needs analysis result into a learning design synchronized with the syllabus from the department. Phase III: Teacher collected evaluation from students regarding the whole package of the English 1 course. With the above design of study, the researcher would like to investigate how far the needs analysis helped teacher in making the teaching learning design, how much the student need analysis result and teacher subjectivity
intervened during the implementation of learning, and how students reacted to the course experienced using such approaches.

B. Discussion

1. English for Science

Branches of ESP are numberless, as it is characterized per field of study. English for science, of which discussion is often blended with the English for technology as English for Science and Technology (EST) is one of those that grabbed the attention in the world of ESP courses as the nature of the field itself is impactful in human civilization. To most technical college students, EST can be as difficult as English for general purposes (EGP) subject, and how to improve students’ EGP and EST competences has become an essential challenge for English instructors as effective language instruction takes various factors into account, such as the teacher, the learner, the materials and the context (Richards in Liao, 2012: 90). It indeed requires thoughtful thinking to select approaches best implemented in teacher’s own environmental context. Traditional approach that views language as a structured system of grammatical patterns, with a trend for formal and bookish language, with the aim to have students producing formally correct sentences and in terms of skills, an emphasis on reading and writing where words are taught by showing and/or explaining the meanings (Ferreira, 2011: 104; Nunan in Boroujeni, 2013), for instance, is not even a choice and is seen to be not working for ESP studies in most, if not all, regions. Several countries have attempted to bring success to their English as a Second language (ESL) or English as a Foreign Language (EFL). Malaysia, for instance, has more than a decade made English as the Medium of Instruction (EMI) to accelerate its people’s English language skills as fast as possible (Hudson, 2009: 65. In Taiwan, suitable instructional materials were seen to be critically effective (Liao, 2012: 90).

EST courses are obviously distinct since they put great emphasis on scientific English and the selection of the appropriate communicative situations that are specifically related to science and technology (Dorrity in Mansouri, 2010: 17). Mansouri (2010: 24) classified the learners’ problem in EST courses into three dimensions
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namely teaching materials used in the English language programmes, methodology being followed by EST Teacher, and assessment procedures. This makes it more challenging for both learners to learn and teachers to teach. On a different note, Laplante (1997: 64-65) said language minority students learning science in English are facing a dual task, that of learning the language in which science is taught and, simultaneously, that of learning science related content. Integrating science instruction with language instruction, he continued, is at the base of any successful science program for language minority students. Several other insightful ideas of teaching he also shared are promoting a language environment favourable to second language development, introducing and formally teaching new vocabulary words, teaching the minor and major genres of science, focusing on conceptually based science themes, reflecting the nature of science in the learning activities, adopting an approach sensitive to the cultures of the students (Laplante, 1997: 68-76). As an alternative offer for a fruitful ESP learning, Bell (in Porcaro, 2013: 34) proposed the idea of three Cs (Curiosity, Collaboration, Confidence) as the three student aspects every ESP teacher must always emphasize.

2. Needs Analysis

Needs analysis can be simply described as an information gathering process (Boroujeni, 2013: 37). Further, Brown in Ulum (2015: 16) stated that needs analysis is the systematic data collection and examining of all subjective and objective information required to describe and validate curriculum goals that support the language learning needs of learners within the context of the institutions that affect the learning and teaching situation. In most cases, needs analysis is more popular and frequently used in ESP classes rather than IN General English or English for Academic Purposes (EAP) classes; they usually employ pre-test to get similar data. Professional ESP courses often begin with the conduction of needs analysis because ESP instructor or programmer feels the need to know every specific language aspects from the student candidates in order to present learning process that meets the expectation of the learners. Experts in the field of ESP stress the importance of conducting a rigorous needs analysis before designing a course, producing a
syllabus, and starting instruction in ESP (Hutchinson and Waters in Porcaro, 2013: 33) as it plays a role as specific ground for future development of the academic activities of a particular group of students (Al-Hamlan, 2015: 120).

To garner maximum validity and reliability with its goal, conducting a needs analysis requires careful choice of approaches. Chambers (in Songhori, 2008: 3) introduced the term Target Situation Analysis approach. Al-Hamlan (2015: 120) ascertained that most convincing or important approaches to needs analysis are sociolinguistic model, systemic approach, learning-centered approach, learner-centered approaches, and task-based approach. While most of teaching experts agree that needs analysis belong in ESP classes, Songhori (2008: 22) believed that today it should not be (and is not) of concern only within the field of ESP, but also that of General English because the needs of the learners is of paramount importance in any language process. He went on suggesting that approaches to the analysis can be comprehensive and touch all aspects constituting an English teaching such as Target Situation Analysis, Strategy or Learning Needs Analysis, Present Situation Analysis, Means Analysis, Register Analysis, deficiency Analysis, Discourse Analysis, Genre. He concluded that different approaches to needs analysis attempt to meet the needs of the learners in the process of learning a second language, and not a single approach to needs analysis can be a reliable indicator of what is needed to enhance learning (Songhori, 2008: 20).

The three-step procedures are discussed in detail per phase and is presented by its chronological order of regulation starting from breaking down the needs analysis result, observing the classroom dynamic during the implementation of the teaching and learning activities, and reflecting the evaluation given by students post the final course meeting.

**a. The Needs Analysis Breakdown**

The discussion on this part starts with the presentation of the needs analysis summary which depicts students’ attitude prior to learning as well as their choice of topic and types of activities expected to be practiced in the actual teaching.
1) Attitude prior to learning

Generally speaking, having students in an English class with an average percentage of 63.52%, 52.33%, and 34.74% respectively for their fondness, ability, and anxiety in terms of English language learning could make teachers take a deep breath. However, this figure could be considered satisfactory enough if students were majoring in non-English related department, which is precisely the case of this research. The better news was that majority (85.24%) disclosed their willingness to learn English, which is truly relaxing for the teachers since he ought not to deal with elevating student motivation which is the primary key in order to achieve fruitful learning outcomes. Coming to know that students have strong aspiration to learn despite lower tokens of fondness and ability in English with considerable degree of anxiety, any teacher would be eager to lead the class into meaningful language learning journey. Data tabulation also recorded that out of 20, only 4 students admitted to have serious fright in attending class and 5 students acknowledge their very low ability in English; even 2 of them confidently said they had zero English competence. This is among few backgrounds the teachers needed to take account and resolve in the following classroom teaching and learning process.
2) **Choice of Topic**

The chart visualizes that there nearly equal demand from the students in regard to the topics of materials to be presented at class. General themed materials, as opposed to science-related ones, were imposed by more pupils. Without doubt, those who opted for science-related were expecting that they could harvest two things at once by attending the English lesson, that is, that it would somehow integrate with their field of study such as being able to identify science-related vocabulary, in addition to get better understanding in general English. Meanwhile, those who chose another stated in their paper that they either yearned for learning about other contents as there are already science-related subjects in the course module, or wished to learn English as it is presented to students who major in English department. The interesting thing was one of the students wanted the lesson to be completely non-science related.

![Figure 3. Student preference of types of learning activities](image-url)
3) Choice of Learning Activities

The survey identified that having discussion, game, book-based and presentation activities were preferably interesting to most of students with an index score above 5 out of 8, meanwhile film/videos and song based activities earned a middle score of 4s, followed by drama and quiz with received only 2s score. Activities that allow students to have an experience to chat or discuss with peers or in groups topped the rank, implying that they demand more practical engagement in their learning process.

b. The Pedagogical Practices

Needs analysis is only a beginning, what is more important is what is next. Framing a final design after handing the need analysis result is not that easy and can even be very tricky. The complexion goes as teachers need to integrate the analysis with the actual syllabus, decide whether to invest all the student major expectation concluded from the need analysis, and that is done within as short as a week approximately if the newly formulated lesson plans were about to be applied a week after the pilot meeting; therefore, it is suggested that teachers have prepared a pre-needs analysis learning design beforehand. Previously, we have acknowledged that the need analysis concluded that in general students had positive attitude with quite low degree of anxiety, demanded rather equally portion of science related and non-science related (a little larger) topics of materials with more of discussions, games, book-related, and presentation activities. On the other hand, the English 1 course used the mixture of grammar and topical oriented syllabus, listing (1) getting to know with others, (2) introducing others, (3-5) part of speech, (6) past tense, (7) perfect tense, (8) present tense, (9) future tense, and (10-12) basic science vocabularies as the primary functions and competences goal. Hence, the plan for the pedagogical design started from there.

From all four aspects of the averagely already positive attitude, it seemed that anxiety and ability are more problematic. To help decreasing the degree of fright at English class, almost all discussions were presented in the form of activities that allowed more engagement and interaction physically and verbally, and
mostly were done through intercommunication with peers, within
groups, and once or twice with the whole students. Students’ ability
in English was pumped through well-concepted and carefully carried
out series of activities that maintained enough contents (not too
ambitious or plenty) and giving it enough time to proceed (not hurry
to end it up in order to catch up with the targeted materials). Second,
regarding the issue of topics of materials, teacher infused science-
related theme in almost half of the activities such as bringing in chain
of introduction game in the getting to know with others session where
students stated reasons for enrolling in science education
department and two areas of science they liked the most; another
example is having a short drama with science related title such as
laboratory equipment, my scientist idol, etc.

Third, the top four highly voted types of activities namely
discussions, games, book-related, and presentation were majorly
applied throughout the course. Presentation was rather omitted
considering student prior knowledge in English but chances to share
opinion or ideas and make them into a performance were
ascertained. The case of importing handbook or having book-based
activities was rather exceptional. To get an English handbook or
workbook that is suitable for classroom lesson, especially for an ESP
classroom is never an easy task. Science department had not
appointed a certain book to be used for the English 1 course, and the
teacher found no book that fitted with the learning goal. The best
policy was gathering material pieces from multiple sources then
modifying and arranging them so that it was in sync with the
formulated design. The overall actual classroom learning design as
explained above can be illustrated as follows.

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Discussion topic</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>Getting to know with others</td>
<td>Game: chain of introduction</td>
</tr>
<tr>
<td>(2)</td>
<td>Introducing others</td>
<td>Game: ropes of names</td>
</tr>
<tr>
<td>(3-5)</td>
<td>Part of speech</td>
<td>Presentation + quiz (vocabulary + preposition)</td>
</tr>
<tr>
<td>(6)</td>
<td>Past tense</td>
<td>Song ‘I Sing A Song’ + drama</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th></th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
<th>(10-12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perfect tense</td>
<td>Present tense</td>
<td>Future tense</td>
<td>Basic science vocabularies</td>
</tr>
</tbody>
</table>

Figure 4. The needs analysis based learning activities

c. Student Evaluation

At the end of the course, a closed evaluation from the student side was conducted to see if the lesson worked best to achieve the learning goal of the English 1 course in the Science department. Students were given the chance to rate the program from 10 to 1 with some spaces provided to narrate their reasons. An average aggregate score of 8.31 was derived, with majority of rating of 8, 7 students voted 9, 3 voted 7, and yes there was no one who actually gave a clean 10. Garnering 8.31 out of 10 could be categorized as a success, not huge but above satisfactory. Some students confidently expressed how the course had been able to offer different but interesting activities compared to what they had in their previous English classes. Many were delighted that songs and films were used too turning as effective learning experiences. Though drama was the second last choice in the need analysis, it was surprisingly accepted more in a positive ways. Few suggestions or critiques were made too by the students but they were not directly related to primary concern of the research issues, such as teacher’s punctuality, teacher’s firmness, and the amount of works given to the students which were made mostly by very few students. In general, feedbacks from students were filled with positive notes on the learning design experienced throughout the course.

This satisfactory outcome of the implementation of needs analysis based approaches is a perfect resemblance of Ulum’s (2015, p.16) that, “The results of the needs analysis support instructors to define the students’ professional needs in terms of language skills, as well as their deficiencies in the area of language skills. Upon examining the students’ needs and specifying the language course objectives, materials meeting the needs of the students might be
chosen for instance. Therefore, needs analysis is the base on which curriculum content, teaching materials and methods are constructed.” There is no wonder that the idea of importing needs analysis in English for Academic Purposes (EAP) or even English department classes also, which actually has been a polemic since a decade ago, becomes very logical (Songhori, 2008: p.22).

**d. Reflection**

One thing to notice from the running lesson is that, despite having the complete information of student needs, teacher did not take them for granted. This is to clarify that result of a needs analysis is not supposed to be always implemented as it is, instead teacher subjectivity can intervene in the middle in order to bridge learners’ wants and learners’ needs (Yalden in Al-flamlan, 2015). This way, rooms for teacher creativity and experimentation of teaching insight take place, which is good for teacher professional development, and through reflection and efforts to be creative and distinctive, teachers can continuously strive to customize their lessons in ways that involve their students and keep learners at the center of the teaching process (Richards in Knott, 2017: 631).

However, this theory raises a question: Does this ‘flexibility’ allow teachers to make a teaching design deviated from the curriculum, or more technically, syllabus as long as it is in line with the needs analysis result? If we take a closer look, teacher did not make even a low percentage of deviation from the original syllabus while implementing needs-analysis based teaching design. As for the context of improving the quality of ESP courses, bringing new ideas to the current syllabus could in fact be a positive sign as it disseminates developmental input to the department. As we know, syllabus for English lesson in non-English department especially the newly run is usually filled with imperfection since it is in its period of finding and experimenting the best representation therefore naturally it is prone to change; until the best and fixed syllabus is discovered, improvement and improvisation is encouraged.

**C. Conclusion**

Based on the research result, we acknowledge that the use of needs analysis in the context of teaching in an ESP course can be as effective for making a course plan as implementing a pre-test for
IDENTIFYING LEARNERS LANGUAGE COMPETENCE, SINCE IT HAS THE ACCESSIBILITY TO LOOK INTO DETAILED INFORMATION OF LEARNERS’ LANGUAGE PROFILE, ATTITUDE, AS WELL AS EXPECTATION WHILE TAKING THE COURSE. STUDENT EVALUATION AT THE END OF THE CLASS ASSERTS THAT THE FORMULATED LEARNING DESIGN BASED ON NEEDS ANALYSIS IS EFFECTIVE IN OFFERING LEARNING EXPERIENCES CLOSEST TO WHAT THEY NEEDED. SECONDLY, INTEGRATING NEEDS ANALYSIS WITH THE APPOINTED SYLLABUS TAKES TIME BUT CAN WORK, EVEN IT CAN BE VERY PROMISING IN ELICITING PEDAGOGICAL APPROACHES AND ACTIVITIES. IN THE FUTURE, MORE RESEARCHES ON ESP TEACHING PRACTICES AS WELL AS ESP HANDBOOKS AND WORKBOOKS COMPOSITION ARE EXPECTED IN ORDER TO ADD REFERENCES ESPECIALLY FOR ESP TEACHERS SINCE THE DEMAND OF ESP COURSES KEEPS INCREASING YEAR TO YEAR.
REFERENCES


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