

Integrating English to Science Teacher Training Classroom

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Abstract

This study was aimed determining the attitudes of student-teachers towards the integration of English in science education. With the impending ASEAN Community of 2015, the Institute for the Promotion of Teaching Science and Technology in Thailand initiated the campaign of combining English usage with scientific tasks. The subjects of this study were forty students, enrolled in the faculty of education, majoring in Science education at Sisaket Rajabhat University, a teacher training institution in the Northeastern part of Thailand. The subjects were assigned to do projects related to science experimentation, and also present their experiments in English. Prior to their presentations, they were trained how to present projects in English. Data were collected by questionnaires, which aimed to determine their attitudes towards the integration of English into their science project presentations, and to compare different strategies used to complete the task. Students were also interviewed after completing the questionnaire. The results stated that the majority of student-teachers considered integrating English in science as very challenging as they needed to practice how to deliver both accurate science content and comprehensible English. Nonetheless, all of the subjects realized how important it is for them as future science teachers to teach in English. Hence, they were willing to practice more with a positive attitude. These findings can be used as guidelines for a teacher training institution to further enhance the integration of English in subject matters.

Keywords: Content-based instruction, teacher training, English use

Introduction

English is important for educational sectors as it gives access to a vast pool of knowledge. In Thailand, English has become an important element in education at all levels, including teacher education. This need is becoming even more urgent as Thailand prepares to join the ASEAN Community in 2015. As an effect, English has been integrated as part of science education since 2013 with seminars and workshops initiated by The Institute for the Promotion of Teaching Science and Technology (IPST) for the purpose of educating science instructors to be aware of the use of English. This can be seen as an indicator that Thailand is readying itself for use of English as a medium of instruction.

Nonetheless, there is a limited amount of research with regards to science teacher training. To bridge this gap and promote the use of English in future science classroom, this present study was conducted to explore the attitudes of student-teachers towards the assimilation of English use in the teaching of science subjects. Specifically, this mainly focuses on the attitudes of science teacher trainees when tasked with delivering teaching and presentations in English. A side issue worth investigating is also the application of oral presentation strategies used by science teacher trainees.

Investigating student teachers' attitudes towards the use of English as a medium of instruction should be a key in defining the success of further integration of English into the subject matter. Teachers in the 21st century should not be well-versed only in knowledge about subject content, but they also need to be aware of how to achieve the level of competence suitable for promoting learners to learn in the current world where English is a crucial tool for functions of everyday life.

Literature Review

English in Thailand

Wiriyachitra (2002) pointed out the role of English as important factor in the progress of business, education, science, and technological development in Thailand. In particular, with the upcoming ASEAN community campaign in 2015 where English has been promoted as a medium of communication for people of the region, the mastery of the language becomes even more important for Thailand. Billions of baht has been spent to raise the awareness and preparedness of Thailand and the Thai people for the AEC (Chonkittavorn, 2014).

Regardless of the budget spent for improving Thai students' ability to be compatible with the ASEAN community, the relatively low proficiency of English in Thailand as compared to other neighbouring countries cannot be denied. Noom-ura's (2013) study found that under-qualified teachers seemed to be the main point of this issue. She mentioned that from a survey conducted with four hundred Thai teachers of English, 60% of the respondents report to having very limited knowledge of both English subject content and teaching methodology for the subjects. This result is echoed in Foley's (2005) study and de Segovia and Hardison's (2009) study where English teachers have reported using the Thai language to teach their English classes. Further subjects had reported a very traditional approach in language teaching, where structure is emphasized, instead of communication.

Attitudes towards English

Exploring participants' attitude towards English was done for three purposes to support the objective of the present study. First, as a means to examine the language situation in the target participants' context, and second, to analyze for any correlation between attitude and strategies used while attempting to complete the English presentation task. The final purpose was to see the willingness of student-teachers in using English in teaching science content. Attitude is considered pivotal as it is one of the key factors in implementing English as a medium of instruction in higher education (Tatzl, 2011).

A fair amount of studies has been done to look at the correlation of student's learning attitude with performance. One of such studies conducted in a Thai context was done among undergraduate students (Hengsadeekul, et al., 2013). The study found that Thai students possessed an instrumental attitude towards the use of English, as they perceived English as useful for task completion and material comprehension. Aside from that, the study also pointed out that the students also viewed English integratively, as the language gave them insights into understanding different people who spoke the language. This study will serve as a baseline for the present study.

Speaking strategies

Speaking skill is an important facet for teachers because it involves the aspects of explaining, telling, and providing knowledge verbally. For the Thai context, one important teacher role is that he or she is a knowledge transmitter, which may give rise to the assumption that teachers who do not talk are not doing their jobs well (Sanprasert, 2010). Nonetheless, as reported earlier, Thai teachers are found to emphasize structural knowledge in their English language pedagogy (Foley, 2005; de Segovia & Hardison, 2009). This may not bode well with the communicative idea that is integral in task-based teaching and learning. With this as a cornerstone, it is necessary that speaking skills of both experienced and novice teachers are at an acceptable level. For second language learners of English, this may be a challenge that may be attended to through the development of strategies. Cohen and Dornyei (2002) and O'Malley and Chamot (1990) summarized that learner strategies in learning new languages include learning strategies, language use and communication strategies. According to Cohen (1988), language strategies is divided into four categories which is also used in this study as a guideline.

In Adamson's (2004) study on Thai language learners' strategies, Thai students were viewed by western lecturers as having limited learning strategies due to the familiarity with rote learning study. In the review of literature of Adamson's (2004) study, it was mentioned by previous research such as Holmes and Tangtongtavy (1995) who offered an alternative explanation for this matter that Thai learners have the concept of *Krengjai*, which means being considerate to pose direct questions to adults, or figures of authority, including teachers. This may be cultural issue that may hinder Thai learners from developing an openly communicative use of English. Nevertheless, the results from Adamson's (2004) study did not draw the conclusion that Thai learners' strategies were limited. Instead, he suggested that strategy training should be introduced appropriately in

light of the local culture. Furthermore, the training of strategies may be necessary for new students entering university.

Integrating English into science education

There is a quite a limited number of studies that deal with the integration of English into science education in Thailand context. Therefore, the researcher reviewed most of the literature of this topic from similar educational context where English is not the mother tongue of the students. A lot of literature came from the Malaysian context where English is promoted as a medium of instruction for both Mathematics and Science. There is a belief that mastering the language will lead to successful learning of mathematics and science (Lemke, 1990). However, some studies found that English can be a great hindrance for learning the subjects' content since many scientific texts use far too complicated language, resulting in learners who are not proficient language learners experiencing difficulty in grasping the concepts (Brown & Kelly, 2009; Sherer et al., 2009).

These previous studies helped in the realization that integrating English into science content is not an easy matter. Therefore, an appropriate level of language added to the lesson should be suitable for level of the students. Language that is too complicated might lead to frustration in trying to link the two subjects. With this in mind, the researcher take decided to begin with a basic experiment, which involved the subjects being recruited for this study. In preparing student-teachers for the in-service experience, it is very helpful for them to be involved in an empirical study so as to promote the conceptualization of learner-centeredness and learner autonomy (Isarasena, 2007).

Though studies into students' attitudes towards the use of English, as well as the related strategies in a classroom setting have been done, the topic has yet dealt with student-teachers. This is of high importance, especially with the paradigm shift in determining the qualification of non-English speaking subject teachers teaching in English. Results may divulge the teaching competences of the future student-teachers, which subsequently may provide a platform for teacher training improvement (Hayes, 2009).

Methodology

This research was undertaken with a group of forty science student teachers taking a Physics Laboratory class. They were all in the third year of a five-year teaching program. At the time of the study, they had completed two fundamental English courses taken at their sophomore year.

The basis of this course was partially aimed at promoting students to produce experimental projects that would be beneficial for their future teaching career. The participants' experiences with English were quite limited as observed from their performance of English courses taken in university. Their English proficiency levels were varied ranging from beginner to pre-intermediate, according to English standardized test administered by faculty of Education.

The study was carried out in three phase:

1. Pre-presentation phase where participants were asked to complete a questionnaire to see their general attitude towards English. The data from this survey was calculated for the mean score to differentiate the groups of the students into those with a positive attitude (mean score over 2.55), and those with a less positive attitude (mean score lower than 2.55).
2. While-presentation phase was done by assigning the participants to present their science experiments in groups. These presentations were graded by English lecturers. During the presentation, they also reported their strategies used for preparing for the presentation. The data was calculated for the mean score of each item to see if there was any significant difference between two groups of students.
3. Post-presentation phase was the qualitative phase where the participants who were grouped according to the results from the attitude survey, as well as the observed speaking strategies in the different groups were interviewed. During the interview, the subjects were asked to freely articulate what they thought about the project, giving chances for the researcher to probe for more information.

Given that the goal of this study is to investigate the actual practice of integrating English into the science classroom, the mixed-method approach was considered advantageous in gleaning more specific and in-depth information.

Results

Attitudes of the subjects towards English

By differentiating subjects according to the mean score obtained from the survey results, eight subjects were categorized as having less positive attitude towards English while the other nine were grouped as those have a positive attitude towards English subject.

The item ranked the lowest in the questionnaire was item 29 (Fluent in English is one of my life goals). This served as a basis for the interview, which yielded interesting results.

According to the interview with the students with less positive attitude about English, they reported that they have never thought of themselves as English-proficient students. For them, as students majoring in science, they prioritize their mastery of science content and the ability to carry out experiments. However, even without imagining themselves as fluent language users, the subjects in this group articulated that they realized that knowing English is vital for their teaching career because some of the scientific terms are in English, which they want to pronounce correctly, and be able to explain the meaning to their future students.

Another item that had a low mean score ($\bar{x} = 1.52$) was item 25 (Finding ways to improve English speaking ability). Data from interview presented the correlation between not including being fluent in English with this item. The subjects reported that when they did not picture themselves using English in their lives, and they could not be motivated to have a self-study to further their knowledge. They thought that the English courses provided by the university were enough to let them get through their academic lives. The major cause of less positive attitude is the fact that the subjects felt that their background of using English is not enough to make them speak with confidence.

All of the subjects, who had less positive attitude participated the interview evaluated their language proficiency at low level. They often mentioned about their insufficient time spent in learning English during their secondary and high school period before entering the university. However, their mean score for item 30 (Interested in learning science content by using English as a medium of instruction) was quite high ($\bar{x} = 3.45$) since they realized that English has become an official language for the ASEAN community and they said they want to keep themselves up to date by using the language to search for knowledge within the ASEAN.

What came as a surprise was the subjects' attitude about the use of English for teaching. The attitude about the importance of English for a teaching career was found among both groups of students to be not very important. The group with a positive attitude reported that their English was not very important for being teacher ($\bar{x} = 1.45$) while the group with less positive attitude towards English found that English was not necessary in teaching ($\bar{x} = 1.00$). This trend continued to item 30, which addressed the willingness to learn integrating English to Science content. The group with a less positive attitude pointed out their reluctance in learning how to combine the two subjects, English teaching of science ($\bar{x} = 1.58$), since they thought that it would be difficult. They also stated that their limited vocabulary knowledge and their lack of confidence in pronouncing English contributed to this reported opinion. The group with positive attitude, on the other hand, showed more willingness in trying to learn science by using English as medium of instruction ($\bar{x} = 2.73$). Regardless their uncertainty about understanding the difficult content in Science, this group of subjects informed that frequent exposure to English can lead to the improvement.

These relatively low mean score for these two items reminded the researcher that there should be more emphasis in combining science with language. The student teachers majoring in science should be frequently reminded that English could be useful for their future teaching career. The first reason for that is to let them be familiar with English-named apparatus. The second reason lies in gaining more knowledge for academic content as numerous amount of information is available in English. They can widen their knowledge about teaching techniques and media facilitating instruction by searching in English content.

After building an overview of the participants' attitude towards learning English, subjects were assigned to make a short video of a science experiment related to physics. The researcher suggested some helpful resources and also asked an expert to comment on the language used. After the clips were made, the second questionnaire was distributed to see how they used different strategies to achieve the goal of making oral presentations.

Metacognitive strategies

Table 1. Metacognitive strategies used by the participants during oral presentation

Participants with different attitudes	Positive (<2.55)	Less positive (>2.55)
	(12 participants)	(11 participants)
Item 1: Effective group preparation	3.42	3.18
Item 2: Appropriate duties division	3.58	3.45
Item 3: Connect topics from each member	3.42	3.18
Item 4: Memorization of the content	3.17	3.09
Item 5: Group facilitates English usage	3.25	3.09

The significant differences in using metacognitive strategies could be determined from item 1 (relating to cooperative in preparation stage) and item 3 (gathering information individually). The reasons for distinction between the two groups were explained as following.

The group with less positive attitude towards English reported a higher level of cooperation at the preparation stage. From the interview, they further explained that they realized that their low-level proficiency made them gather together during preparation stage. They felt more confident when they could work side by side with their friends regardless of the time spent for scheduling for a time that suited every group member. The major task that required them to work with each other was selecting relevant content for the experiment. During the very first step of preparation, they had to decide which kind of experiment they would like to do. For the group with a positive attitude towards English, this process had been done individually before taking each preference to the group to decide the most suitable topic while the other group could not continue without members' confirmation. For item 3 (gathering information from each member), the participants with less positive attitude represented a higher level of successfulness due to the fact that they defined the term "individual" based on the section of assigned work rather than counting on each member of the group. These participants viewed their level of accomplishment from peers' assistance. The other group whose attitude towards English was positive viewed their work individually at a lower mean score as some of the group member had sent their work late or selected inappropriate content which could not be used in actual presentation. The latter group tended to work separately before presenting what they had found to the group. As a result, when combining the content from each member, some content were dismissed unlike the previous group who worked and consistently approved the content. Their level of achievement in combining content became higher.

Cognitive Strategies

Table 2. Cognitive Strategies used by the participants during oral presentation

Participants with different attitudes	Positive (<2.55)	Less positive (>2.55)
	(12 participants)	(11 participants)
Item 1: Write down new words	3.08	2.82
Item 2: Compose English notes	3.08	2.73
Item 3: Pronounce correctly	3.33	3.45
Item 4: Look for main ideas	3.08	2.91
Item 5: Make English summary	2.67	2.64

The group with less positive attitude towards English defined the way they wrote the memo for helping them in memorizing as jotting down all the important content in English. They reported that this method made them feel more confident in speaking when they saw the note right beside them during both the practice and actual presentation sessions. On the other hand, the group with a positive attitude did not depend on their notes much. They said they wrote down important ideas and looked at their notes during

practice period. However, they mentioned that the note was not as important as memorizing the content by themselves.

The group with less positive attitude reported more use of Thai language when they struggled in expressing themselves during the presentation. Despite the fact that most of them had notes with them while presenting, they felt nervous and used some Thai words or phrases when they could not think of the English equivalent.

Communicative strategies

Table 3. Communicative strategies used by the participants during oral presentation

Participants with different attitudes	Positive	Less positive
	(<2.55)	(>2.55)
	(12 participants)	(11 participants)
Item 1: Using gestures	3.17	3.00
Item 2: Create new words	2.08	1.91
Item 3: Use Thai	2.00	1.64
Item 4: Skip some parts	1.58	1.64
Item 5: Use phrases to explain terms	2.08	2.18

The group with less positive attitude tended not to skip the part that they could not remember, most probably because they had their notes with them. Therefore, they just consistently read from the notes and avoided any pauses. The group with positive attitude attempted to recall the whole presentation and became nervous at the actual presentation. As a result, they reported more frequent times of skipping and pausing.

Rehearsal strategies

Table 4. Rehearsal strategies used by the participants during oral presentation

Participants with different attitudes	Positive	Less positive
	(<2.55)	(>2.55)
	(12 participants)	(11 participants)
Item 1: Remember from the notes	3.08	2.82
Item 2: Several rehearsals	3.67	3.55
Item 3: Group rehearsal	3.67	3.55
Item 4: Giving feedback	3.58	3.45
Item 5: Benefit of group pre	3.25	3.36

The group with less positive attitude claimed that they tried to memorize the content from their notes. However, they found themselves failing in presenting naturally. They reported that when they looked at themselves in the video presentation, they felt like their oral presentation did not sound as natural as it should be. The other group with a more positive attitude towards English, on the other hand, reported a similar attempt to remember information from the notes they made. However, for them, it was not to remember every single word, but to remember only the steps of the experiments and key words that they had to use during presenting.

Regardless of the fact that the group with less positive attitude preferred working together in the preparation stage, when it came in to presenting, they reported that they had not practiced presenting with their group as many times as they expected. Most of the participants belonging to this group found that they tended to use the notes that they have made during preparation to practice separately. Shyness to speak in front of others became a significant issue at the actual presentation stage. Therefore, they reported a lower mean score in item 5 (practicing in group facilitate memorization and better presentation). On the other hand, the group with positive attitude seemed to be more concerned more about the flow of the presentation. From the interview, they mentioned several times that rehearsal with group members helped a lot in making their presentation sound natural. They had to take turns presenting the steps in the chosen experiment, so the smoothness of moving from each step was needed. Therefore, they mentioned that group work helped a lot to better their presentation.

Conclusions

The issue of attitude not only affected how participants used different strategies in coping with the oral presentation task, but also influenced the way how they viewed themselves as science teachers in the future. Regardless the fact that all participants realized that English became vital in Thailand education, the willingness to try combining the two subjects were varied according to attitudes. Although all of the participants were enrolled in the same major and same faculty in their undergraduate study, their background about English exposure were very different. From the interview, subjects with less positive attitude towards learning English tended to have an unpleasant experience in learning the language since they were in high school. This affected the way how they see themselves as a science teacher, who can integrate English in their classroom, in the future. A lot of participants often mentioned about their reluctance of using English in their future classroom because they felt that they lack knowledge to pass on to learners. They felt hopeless in combining the complex content of science with English. Some of them mentioned that they were willing to try if the faculty provided them with special trainings and support. On the other hand, the students with positive attitude were different significantly in terms of their view of themselves as future science teachers. From the interview, they stated that after conducting the oral presentation project, they realized that they had to try a lot harder in improving their English speaking skills. They asked for more training and solicited suggestions on how to improve their English ability. They even asked if it was possible for teachers to partly give lectures in English to make them familiar with the language. For the strategies used, it seemed clear that the group of participants who have less positive attitude used strategies to help them be able to present their experiment more frequently. Form the interview with them, the researcher have learnt that they depended on various strategies because they thought that only their limited ability of English was not enough to survive this project.

This study concludes that in order to promote science student-teachers to become more aware of integrating English into their lessons. Promoting a positive attitude towards using and learning English is needed. Without the positive attitude, student teachers might be hesitant to use English as the medium of instruction of science content. More importantly, teacher training institutions have to have the awareness that knowledge about the medium of instruction is as important as the content for instruction. In this era, science teachers have to know more than just science concepts and how to conduct experiments. Science education in the ASEAN period will also need to take into account how to make the content accessible and transferable within the wider community.

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