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Demystifying and Coping with English for Science and Technology

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Abstract
Advancement in technology acts as a catalyst in the modern world as it constantly challenges old ways of doing things. Its impact on the English language has far reaching consequences in all walks of life. The English language is dynamic, adapting to the development in science and technology, which in turn responds to scientific, technological, social and economic needs. Teachers of English for science and technology have a new function which is keeping abreast with the galloping advancement in science and technology. A crucial problem for students is using the new words flexibly, and in cases where there are other English meanings, be able to come out of the scientific boundary and discuss scientific and non-scientific issues confidently Forchap (2016). This calls for hard, careful and thorough work so as to make the teaching and learning of EST meaningful.

Science and technology are problem-solving and so is the English language. It is therefore important to demystify the teaching of EST in order to solve a problem in the world of science and technology.

In Cameroon, there is a dire need to raise awareness. As pointed out in Forchap (2016) the university authorities cling to the traditional methods of teaching English and resent changes. It is in this light that seminars and workshops are recommended to sensitize teachers of English on this issue. The university authorities are in control of the curriculums which makes it easier for English courses to turn to the right direction which aims at accelerating the growth in English courses to meet the needs of specific disciplines.

Key words for Specific purposes ; demystify ;awareness ;science and technology ; integrate

1. **Introduction**

For the teaching of English for specific purposes to be meaningful, the teachers themselves need to undergo in-service training to acquire the skills. Experts in the domain of ESP affirm that EAP/ESP is specific and technical. Trimble (1985:1) points out that, they (With Larry Selinker), before they could adequately teach English for science and technology to non-native undergraduate students at the University of Washington; they "had to learn something about it". The students can surf the net for information, the information has to be useful for communication. The teacher's role is to use the material from research work to teach students the linguistic skills which will help them in achieving their goals.This has been experimented in the University Institute of Science and Technology for Central Africa and the results showed that the approach could serve as a model for other University Institutions, national and international, from which they could draw inspiration.

This study takes a close look at the new machines, equipment and ways of doing things that are related to modern knowledge in hope to orientate students towards their specific needs in English for science and technology while identifying areas of grammar to be taken care of. This is different from the kind of English teaching going on in Cameroon where anybody who can speak a bit of English whether Francophone or Anglophone is employed to teach-a deplorable situation which needs to be corrected. This article intends to bring to light the danger of employing unqualified and inexperienced teachers to teach English Safoso (2011). It must be admitted that English is a technical subject and should be handled as such. Those untrained teachers come to teach with grammar books, teaching grammar in isolation and vocabulary from comprehension passages which have nothing to do with the purpose for which the learner is studying

English. This situation has to be redressed and this article is the first step. The next step will be to sensitize schools by making the article available to the authorities. The last step will be frequent seminars.
The data came from 50 engineering students whose first foreign language is French and who were divided into 5 groups.

2. The situation
The students of The University Institute of Science and technology are mostly Francophones. This exercise was carried out in a class of Francophone students. Cameroon being a bilingual country with English and French as official languages is an advantage for French-speaking Cameroonian students who can barely understand English. This is an opportunity to intensify their effort in the learning of English in the new world of science and technology. In an attempt to cope with the challenges of the galloping pace in the advancements in science and technology, awareness of the importance of the English language has to be raised in the University Institute of Science and Technology Forchap (2015). This is no doubt demanding, but worthwhile. Knowledge and understanding of the importance of English in the area of science and technology acts as an incentive that encourages students to work harder in order to use English confidently.

The classroom situation in UCAC-ICAM provides a conducive atmosphere for the teaching of EST, contrary to that of most classrooms in the Cameroonian universities where, "besides the lack of relevant programs, most classrooms are overcrowded- most classes ranging from 100-500 students" Safotso (2011:65). The classroom of 50 students is ideal if the goal is to establish a situation and program "based on an analysis of learner's needs" (Hutchinson and Waters (1987:53). This proposition favors the reason for the importance given to the needs of the EST students whose needs depend on the development in science and technology and which in turn determines and dictates the pace and needs of other disciplines.

3. Methodology.
Situation activities in the area of science and technology were carried out by students in order to identify their needs.

In this study, 50 engineering students whose first foreign language is French were divided into 5 groups. Each group had to convince the class about the importance of some new invention or discovery from any source of information technology. After the presentation, presenters asked questions for the class to answer. The rest of the class had to respond by asking challenging questions while the teacher played the role of a mediator and noting salient points in grammar, vocabulary, pronunciation, writing, reading and listening for classroom drills.

In the traditional method, students worked in class as the teacher instructed on what to do. 5 passages on science and technology were used. Work for the first week – 8 hours consisted of reading an article and answering the questions that followed for 2 hours 30 min. including the time of correction in class when students read out their answers. The next exercise was speaking for 1hour 30mins. Students were asked to comment on the article. The next four hours were for listening. Students listened to passages and answered the questions asked by the teacher for 2 hours 30mins including time for correction. This was followed by picture reading for 1hour 30mins. Students looked at given pictures and from the information in the pictures, say what had happened, what will happen or what is happening.

In the second week, an exercise on grammar and vocabulary from a given passage was given to the students who were asked to write appropriate prepositions in gaps, to work in pairs telling each other how to get to places, describing an object, relating past events and using the different tenses. This was for 2hours. The next exercise was on general discussions on various topic- future developments, science and technology for 4 hours. The next 4 hours were for written and oral exercises on grammar vocabulary, speaking, listening, reading and writing.

All this was for two weeks-16hours.

In the experimental method, the 50 engineering students whose first foreign language is French were divided into 5 groups. Each group had to convince the class about the importance of some new invention or discovery from any source of information technology. After the presentation, presenters asked questions for

the class to answer. The rest of the class had to respond by asking challenging questions while the teacher played the role of a mediator and noting salient points in grammar, vocabulary, pronunciation, writing, reading and listening for classroom drills. In addition, other groups had to read the articles of other groups to prepare to answer questions when asked.

This exercise was programed for 16 hours. Given that the number of hours allotted for English on the time table is 8hours a week, this was done in 2weeks. Each group had three hours for presentation, questions, answers and comments.

Experimental Activities
Topics

First group: 3D-Printed Plastic Folds itself Into Amazing Shapes.

Second group: Restroom Hand Dryers Are Blowing Bacteria Everywhere

Third group-Walking

Fourth group- Smart Wireless

Fifth group-. Biodiesel production methods.(Biodiesel production is the process of producing the biofuel, biodiesel, through the chemical reactions transesterification and esterification)

Questions asked

Questions asked verbatim
Topic: 3D-Printed Plastic Folds itself Into Amazing Shapes.

Presenter	Answers
1. What does it *talks* about?	*It about* technology that *produce* flat-pack f*urnitures.*
2. *What is doing* the flat-pack furniture	*No answer*
3. *I say* that 'Flat- pack *compuct* how?	*It do that* the *final etap i*s good furniture.
4. Who *is author* please?	An, Gu, and Ye *are lead authors* of the paper. Other Co-authors are from Carneige mellon, Zhejiang University, Syracuse University, The Univrsity of Aizu,and TU Wien.
5. When *have it been posted*?	On April 2018 the 26th
6. Ok, could you *talk me* about the advantages of this new technology please?	This process called self-folding helps to Produce quickly and at a lower price compared to 3DPrinting.
7. *Who know* the web link	I *write it* for you. It is' https://www.futurity.org/3d- printed-self-folding-materials-1740412-2/

Class

Questions	Answers
1. Who wrote the article?	A certain Mindy Weisbeger.
2. How *works it*?	When you heat it, *it is folding into shapes* as you want example a rose, a boat or even a bunny.
3.What is the use?	This is the first step. The second step *will make that flat-pack furniture assume* another shape which is final and when you heat it, with a heat gun. This can help for urgent situations where you need a house. This is what Lining Yao, assistant professor in the Human-Computer Interaction Institute and director of the Morphing Matter Lab at Carnegie Mellon University *has said*.
4.*What is difference* between the other 3D printer and this one?	This process *help* to print quickly and at a low cost.

Second group: Restroom Hand Dryers Are Blowing Bacteria Everywhere

Presenter:

Questions	Answer
1. What will happen if you use a hand dryer after using a public toilet?	You *will have problem*
2. What is the problem?	You will contaminate your hands.
3. How will you contaminate your hands?	The air will *attrap* bacteria.
4. Who put this to test?	Researchers at the University of Connecticut School of Medicine
5. What did the study authors report	They *report* that they put 36 plates in public restrooms. Firsly without hand dryers *and next time with them*.(sequence of events)
6. What was the result?	Without the hand dryers, there

were no bacteria. With hand dryer there was bacteria on the plates.

7.What is one step that *help* reduce bacterial circulation in bathroom? We can put (fit) HEPTA filters, that the *scientific have discovered* in the hand dryers.

Class

Question	Answer
1. Who *write* the article?	A certain Mindy Weisbeger.
2. What can we use then to be safe?	I think you should use clinex to dry your hands.
3.What is a hand dryer?	It is *the thing you* use to dry your hands when they are wet.(the thing)
4. *Explain us what the type of bacteria that was present.*	Multiple bathroom samples, for example,microbe Bacillus subtillis,an occupant of the human variety of florata". 62 types of diverse bacteria representing 21 species, including Staphilococcus aurreus, a comm bacterium that is part of the normal microbiome but which is also associated with serious infections, according to the study.
5. Do you know all the *type* of bacteria?	These are scientific names. We *must go to study them*
6.Will HEPTA filters destroy all bacteria?	No, it will not. Some bacteria will still be there. It will only reduce the risk of pathogen exposure.
7.What is pathogen?	It is something that makes you sick (causes disease in your body)

I know that they are not good and are dangerous.

The names are given by *scientifics.*

Group 3

WALKING

Presnter

Questions	Answers
1.What is the article about?	It *talk* about *importance* of vision and the role of eyes in a man's life.
2.Can you *recall me when* this article was *writing* and who *is author* of the article?	It was *writing* on the 25th of April 2018 and it was *publish* by Rachel Griess.
3.How many findings do you think could lead to better treatment for mobility impairments?	Four findings could lead to a better treatment
4. According to you, why was this article *publish*?	The aim of this article is to show how vision *keep* people steady while they are walking or mobile.
5. What is one beautiful thing? about visually guided walking	it *involv*e every level of our perceptuomotor hierarchy
6.What does that *means*?	I don't know, but that is what you have said.(Teacher enlightens by breaking up the words)= perception – look it up- nearest in meaning to understanding.-motor part of a machine that makes it work or move, by changing power, especially electrical power, into movement.

Class	Presenter
Question	Answer
1. *How to understand* this phenomenon?	You need to know how vision works, how planning works, how muscles work, how spines work, how physics work.

2 What do Eye movements are Eye movements are informative as a window into the cognitive process.

3. What means the cognitive process? It is knowing, understanding, and learning something:

4. Is walking related to looking? Yes. You walk quickly with longer strides on the flat terrain, because you look down only sometimes and you don't wait to look all the time when there are obstacles.

4th group

I. Article

Smart Wireless

Presenter Class

1. What is the name for the new standard by 2018. It is called Wi-Fi 802.

2. How is it going to work? It will be a small revolution, borrowing 4G cellular technology to optimize the flow of wireless .

3.Who is a network user? A network user is someone who *go to network* to do something on internet

4. What is *the* smart wireless? It is a new connection able to adapt to the conditions of use.

5.What does that *means?* It means that user can optimize the flow of wireless connection according to their use.

Class **Presenters**

1. How is it possible to optimize the flow of wireless connection? It is possible when the cellular 4G technology is *combine* to the actual wireless connection

technology.

2. When could it be operational? It shouldn't be available until end of 2018 or 2019.

3. Why shall it take a long time *like that?* Because *his* application results *of* a new standard 802.11ax and also the capacities of companies to adapt it to their *equipements.*

5th group

Catalyst-free technologies for biodiesel production

Presenters Class

Questions Answers

1. How many *reaction* are included in producing biodiesel such as Total in BRAZIL? To do it, we will do a transesterification process.

2. What kind of reaction *it is* ? It's a catalyst-free reaction

3. What is a catalyst reaction *I look in my dictionary* and see that "It is a substance that makes a chemical reaction happen more quickly without being changed".

Class **Presenter**

Questions Answers

1. What is Biodiesel production? It is the process of producing the biofuel, biodiesel, through the chemical reactions transesterification and esterification.

2. What is trans esterification and esterification *It is a way that you do* to make good oil We can say they are scientific words.

3.*Why it is* important the biodiesel production methods? It is because people want to use *method that work well*.

Analysis

The exercise brought out specific language features to enable the teacher to work out a detailed course program for the students focusing on the problem areas.

Topics

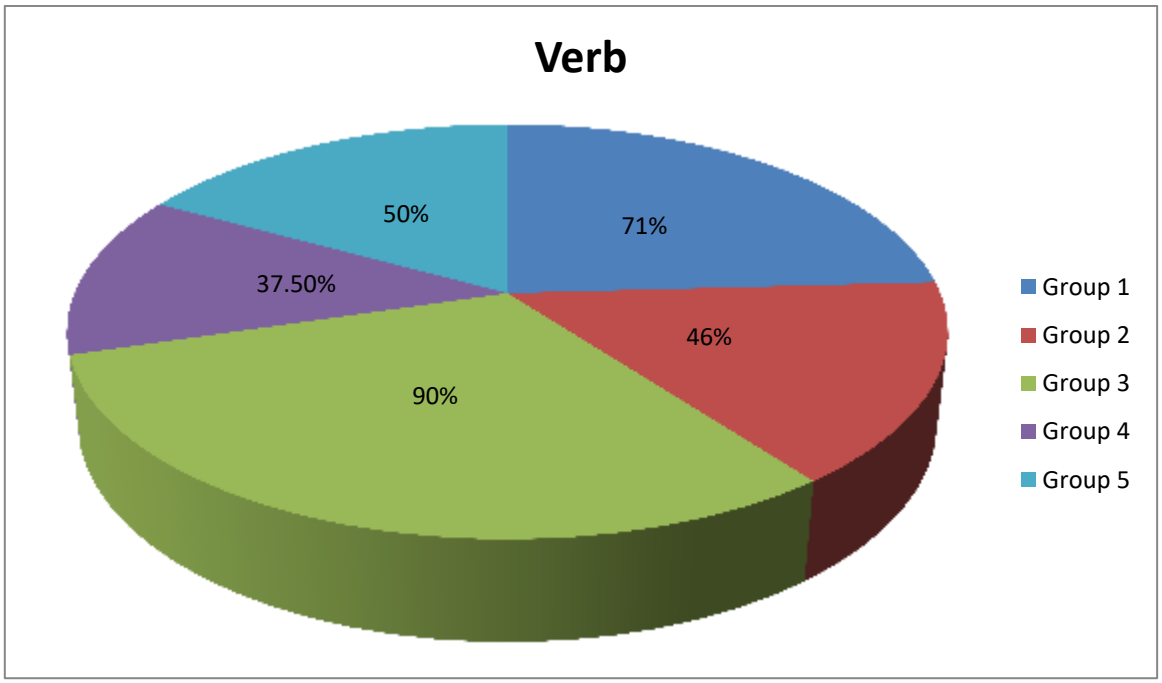
Group 1: 3D-Printed Plastic Folds itself Into Amazing Shapes.

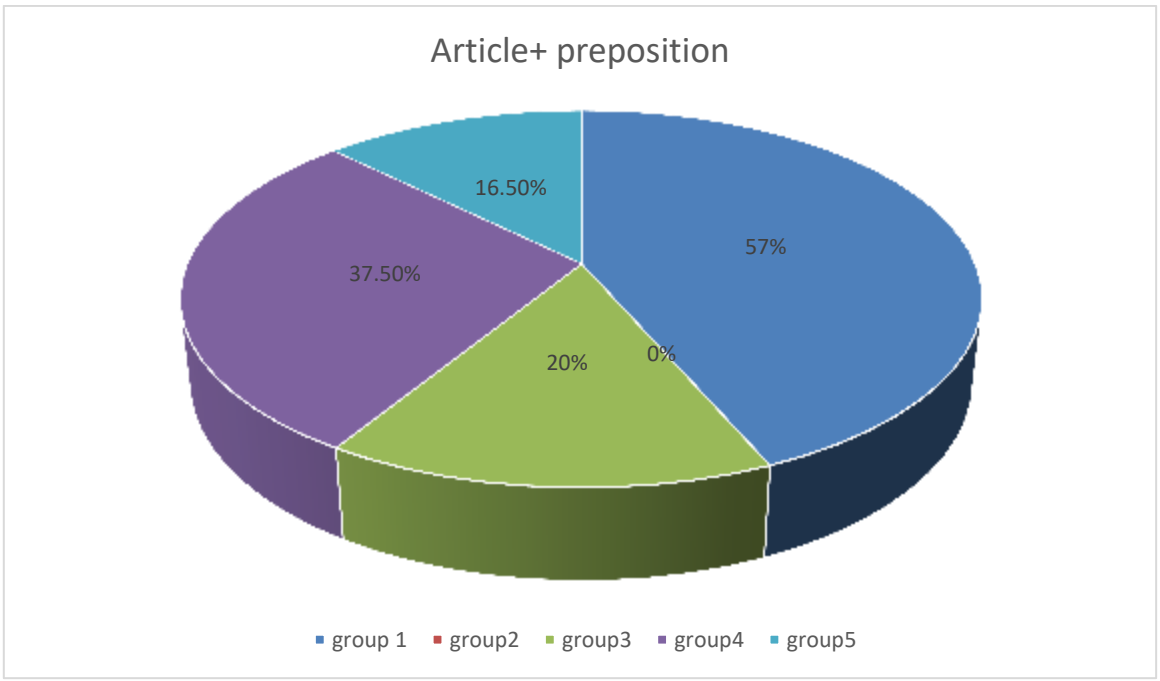
Group 2: Restroom Hand Dryers Are Blowing Bacteria Everywhere

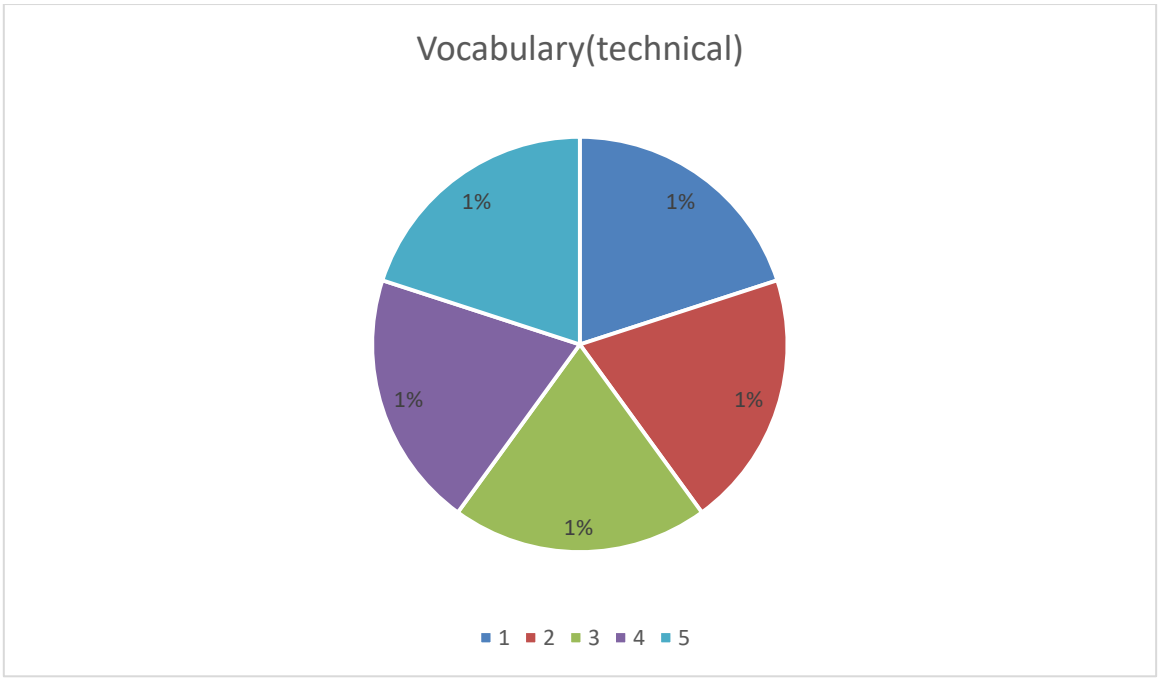
Group 3: Walking

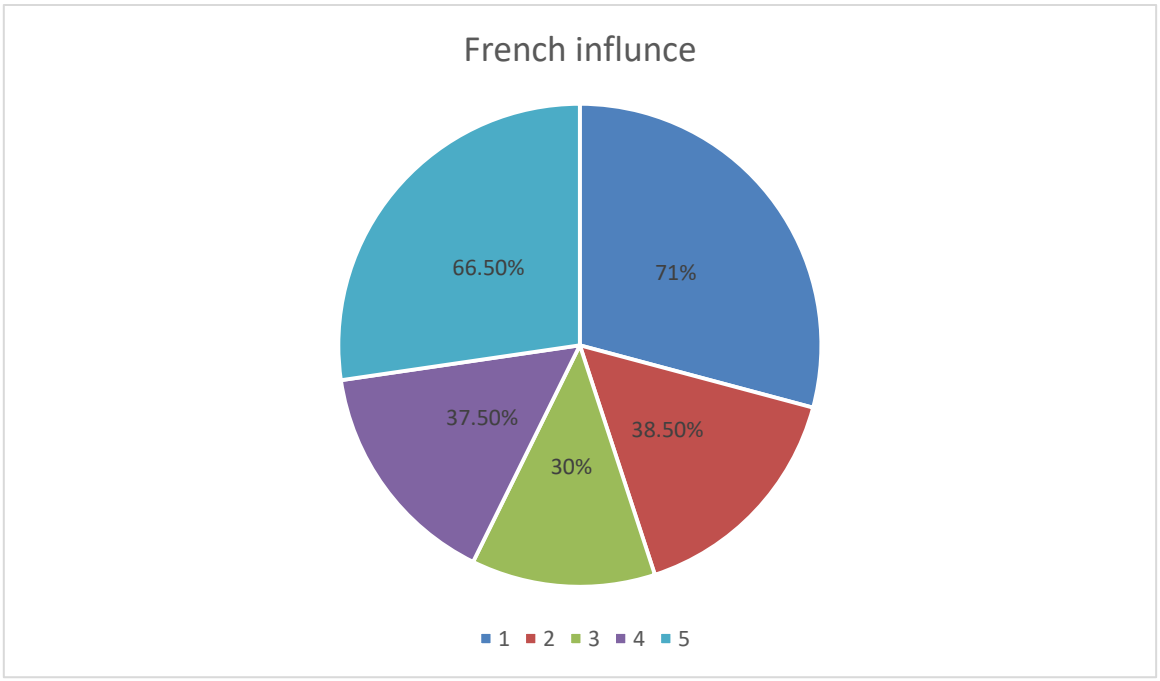
Group 4: Smart Wireless

Group 5: Catalyst-free technologies for biodiesel production









In the traditional approach students worked in class as the teacher instructed on what to do. There were comprehension passages which involved reading an article and answering the questions that followed. Most answers were just uplifted from the passages. In some cases, the answers made no sense. This was because students looked at the questions and guessed where the answers could be found and just copied without knowing where to begin and where to end. You could get words just jumbled up. In the speaking exercise, Students were asked to comment on the article. Most of them did not understand the passage as there was no concentration. The teacher could not follow up the students individually as it was the whole class working on the exercise at the same time. In the listening exercise, there was a lot of distraction. Students listened to passages and answered the questions asked by the teacher. This was followed by picture reading. Students looked at given pictures and from the information in the pictures, say what had happened, what will happen or what is happening. The problem here was that, not every student in class could be given the chance to express himself due to time factor and so students did not take the exercise seriously since, it did not involve some kind of evaluation.

The grammar and vocabulary exercises came from given passages. Students were asked to write appropriate prepositions in gaps, to work in pairs telling each other how to get to places, describing an object, relating past events and using the different tenses. This exercise did not relate directly to the students' area of study therefore, there was lack of interest. For the general discussions on various topic-future developments, science and technology, students were active but there were still passive students because there were no specific tasks involving every student. For the written exercises, there was copy work and a lot of gambling about answers.

4. Analysis and Discussion

The above statistics show that the 5 groups asked and answered 44 questions. 59% of the questions and answers, contained verb errors, 22.5% articles and prepositions, 00% technical vocabulary and 45% of French influence.

Attention is drawn to technical vocabulary. 00% means the students master the vocabulary they use. Examining the situation critically it becomes clearer how the vocabulary is used. It is like reciting a verse which exists can be no error when properly reproduced.

The teacher has material for vocabulary lessons.

Take for instance:

Question: 'What is Biodiesel production?'

Answer: It is the process of producing the biofuel, biodiesel, through the chemical reactions of Trans - esterification and esterification'. What does all this mean?

This could be broken up as follows:

1a. 'bio' is a prefix relating to living things. Once 'bio' appears it has to do with living things.

1b. 'diesel' is oil used in engines.

When students come across the prefix 'bio' they associate it with life and diesel to do with oil in engines. Hence, biography should do with life (a book that tells what has happened in someone's life). Just like biology, biometrics, biomass etc

2 trans esterification and esterification . If Trans means across or between two things, then esterification which is purely a scientific word should mean esterification across or between. The science teacher will explain the scientific word and with the knowledge of English they understand better. The reason for which the science and English teachers have to work hand in hand.

3.flat-pack furniture. The students know what is flat. As for 'pack', there are different meanings depending on the context.

Is it 'something wrapped in paper or packed in a box and then sent by post or taken somewhere?

Is it 'a small container usually made of paper that something is sold in?

Is it a bag that you carry on your back? Or

Is it a group of wild animals that hunt together?

From the context and from the explanation given by the science teacher students are able to learn by association. The English teacher's role is to expose them to the different meanings and how the word is used in different contexts.

Since Francophone students have the problem of interference, it is an opportunity to explain the word furniture which is usually confused with 'furniture' which means (writing material) stationery in French.

Other words to be broken up and explained are; smart wireless, Catalyst, Printed Plastic, Folds itself Into Amazing Shapes, Restroom Hand Dryers, Blowing Bacteria Everywhere, Network perceptuomotor (perceptive, perceptible, perception), hierarchy,

5. Discussion

Trimble (1985) brings out the characteristics of EST and makes many assessments of problems and suggestions for teaching the English language as it has become a problem-solving language as well as a cross-curricular subject. He reiterates the point that the EST teacher is not expected by the content teacher to make up for all the difference-the reason for which both teachers have to work hand in hand to meet the needs of the engineering and technology students in order to improve their language skills to understand their subjects.

Imagine a situation where scientists and engineers were unable to communicate with one another, language being a barrier.

What if inventions and discoveries were published in the different languages of the inventors?

And if researchers published in their different languages, what would be the need of publishing if it were only for the speakers of that language.

Researchers wish to publish their research and read about the work of other scientists and engineers in other lands

If a scientist or an engineer made a breakthrough, how would the world know?

He is keen to work internationally and so he has to use a language that will reach out to every scientist.

If there were errors in a theory, would speakers of other languages be able to react?

There has to be a reaction to a discovery or invention. It is only by reading and understanding the work that a reaction could be provoked.

Hence, English has emerged as a problem-solving subject, not only in science and technology but in all disciplines.

There would be a slowdown in science and technology and the kind of galloping pace of technology existing now would never have been experienced.

Brush aside English and you kill science and technology!

It is one thing writing and another thing writing well.

Science 303, 1333 (2004) cited by Forchap (2016) drives home the same message, when it remarks that "good scientists write carefully but not defensively". It explains that scientists may write, but because of poor mastery of the language, their words could be taken out of context. It further explains that, "the issue surrounding verbal scientific discourse used to pose no problem" but it has become a concern; Neils Bohr, the scientist, was noted for his poor performance in language, but he was a hero in his domain. Einstein, who had wanted to prove Bohr wrong in the debate about quantum mechanics, realized his own error and had to fight with the weapon of language to make Bohr's discovery understandable to the world. If Einstein lacked the right words and expressions, this point might never have been made clear. "There is a relationship between language use in sciences and the accumulation of knowledge of new discoveries. It is that existing linguistic usage which leads to new coinage of terms and usage. Statistics show the prowess of the English language among other languages".

The overall results were that firstly, in the experimental activities, individual as well as general problems were exposed making it easier for the teacher to identify areas for work. Secondly, the exercise made way for the drawing up of a relevant program for the students. Thirdly it provided the students with the impetus

to do research with the aim of coming out with something new. Lastly, it enlightened the students on how to identify and use components of English words in scientific and day to day contexts.

In contrast to this, in the Traditional group work, some students, successfully, dodged away from work given, the exercises were far-fetched since they seemed to be irrelevant to the students of science and technology. There was no enthusiasm, Students seemed bored. There was nothing challenging, nothing captivating. Whereas in the experimental group work, students were marveled at the fact that the teacher could talk about science and technology.

6. Conclusion

Chandra (2017) throws light into the necessity for the English teacher to delve into science and technology: The teachers of English in engineering colleges ought to acquire a specific set of competencies and get trained in latest Teaching-Learning Strategies. A learner-centered approach facilitates learning through techniques involving learners. Students are provided an opportunity to put grammar to use and to relate grammar instruction to real life situations.

Converging, science, technology and English into one big subject, brings them to the meeting point of 'English for Science and technology' thereby demystifying EST and coping with it..

The experiment has unraveled the mystery veiled behind the idea of the English teacher teaching in relation to science and technology.

It further throws light on the advantages of the English teacher and the science teacher working together for a common goal.

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