

# Improving Scientific and Technological Awareness Through Language Classroom

Hendi Pratama

Universitas Negeri Semarang, Semarang, Indonesia  
 hendipratama@mail.unnes.ac.id

**Abstract---**There is an urgent need for language teachers to prepare their students to be able to cope with disruption era. Language skills *per se* are not comprehensive enough for the students to be adaptive in the ever-changing society. Technological shifts such as artificial intelligence and gene editing will change the landscape of future of workforces. Unfortunately, students in language departments have minimum contacts with technological and scientific updates outside their classrooms. An intervention needs to be done to better this situation. It must be decided to optimize the fluidity and adaptability of language teaching. Language classrooms as fluid spaces can be integrated with different set of knowledge and skills, in this case scientific and technological awareness. The researcher has prepared a module consisting of eight meetings of English Debate class integrated with seven major themes in current technological advancement. The development of this endeavor is reported at this conference.

**Keywords:** *scientific, technological awareness, language classroom*

## I. INTRODUCTION

Foreign language teachers shall care about the future of the students in disruptive era. Foreign teachers should question whether or not their students will remain relevant to the society and industry when they graduate later on. There is a tendency that foreign language teaching is classical and slow to adapt with the current technology and scientific updates. This tendency is not ideal for the compatibility of foreign language major graduates and current working situations.

The problem is not only on preparing the foreign language students as relevant and modern workforce. The concern of foreign language teachers must go down to the basic idea that language cannot be separated from the content of the communication. In this ever-growing technological advancement, students shall be able to use their foreign language covering many technological and scientific topics in both professional and informal settings. Very little efforts have been done by language teachers to help the students to improve their content.

Improving language students' mastery on advanced topics can suppress the proliferation of hoaxes. Hoax proliferation nowadays is at the level of threatening democracy and scientific credibility. It is part of the responsibility of educators to mitigate the adverse effects hoax by introducing technological and scientific content to foreign language students. There is also tendency of old conspiracy theory such as flat earth is penetrating the society in a new rate of acceptance. Educators shall also tackle this kind of problem. Non-validated stream of science and pseudo-science must not enter our education system at all cost.

The problems I elaborate above are enough reasons for researchers to start to think about ways on how to integrate language teaching and technological and scientific awareness. Some of the main goals of this endeavor are to (1) improve the acceptability of language learners in future society and workplaces, (2) improve the content of language learners and (3) prevent students to believing and/or proliferating hoax and pseudo-science.

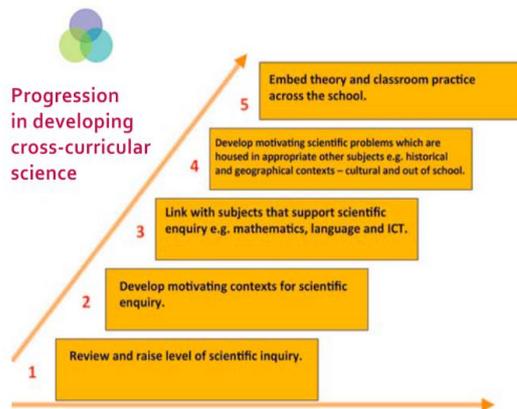
## II. LITERATURE REVIEW

### 2.1. Declining Society's Interest in Science

The efforts to popularize science is needed because there is a tendency that interest in science has been declining in young people (Giacomelli & Giacomelli, 2004). Popularization can be done in many ways but one of the most effective ways to do that is to simplify the concepts of complex science to common audience. Gianni Puppi in Bologna stated "If you are not able to explain to your aunt in less than 5 minutes what you are doing in physics, then you have not really understood what you do". That principle of science simplification can be used in the integration of technological and scientific awareness in language classroom. Science simplification is aimed to improve understanding. However, simplification must stick to the scientific principle and minimize reduction in understanding.

In Europe, a very elaborate project has been conducted to integrate Mathematics, science,

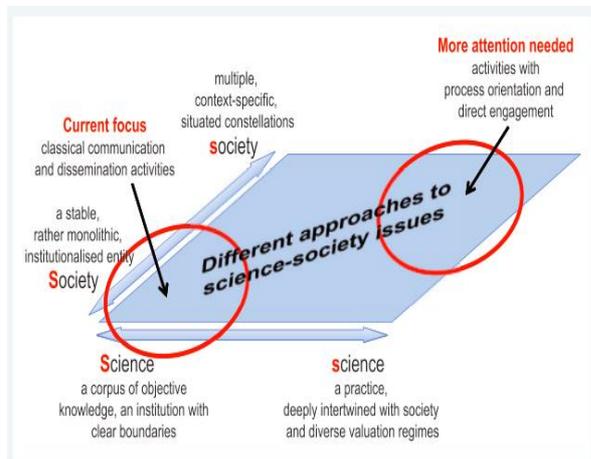
information technology and language. The project is called “Fibonacci Project”. The summary of the project can be seen at the following figure 1.



**Figure 1.** Progression in Developing Cross-curricular science (Jarvis, 2012)

From figure 1. we can learn that science teaching is most effective when it is integrated with other subjects such as mathematics, language and information technology (ICT). Context can be established firmly and students can profit from the frequency of the scientific concepts mentioned in different subjects. Cross-curricular approach is beneficial for the schools and the scientific community.

Europe Science Foundation (Floud et al., 2013) calls this era as a turbulent era in terms of developing society's awareness on the importance of science. It seems that the society has drawn itself away from science because they see a little connection between science and well-being. That is the reason why Europe Science Foundation suggests that we need to adjust our approaches to solve the issues of science and society.



**Figure 2.** Different Approaches to Science-society Issues

In Figure 2., Europe Science Foundation proposes that science cannot be conducted for the sake of science only. The line of enquiry in scientific practice and scientific professionals must "deeply intertwined with society and diverse valuation regimes". Scientists, science institutions and can no longer separate scientific endeavor and the society. There must be conscious effort to make science relevant with people's life and make sure that people understand the importance of science in their social and practical life.

Government and scientific institution should try to simplify the correlation between science and society's life in general. Of course, scientific simplification should be done carefully so it does not turn into oversimplification. The society understand the obvious correlation between science and their well-being. OECD PISA (2015) shows that there is a strong correlation between science performance and per capita income. This kind of evidence is sometimes needed because what people believe can be the exact opposite of the graph. People might believe that income can mainly be generated by business acumen or entrepreneurial endeavors and not by improving scientific performance.

**2.2. Integrating Language Teaching with other Contents**

Integrating language teaching and other content is not a new activity. However, the variation of executions and results of the integration is still worth discussing. On theoretical level, integration between language teaching and other content has been discussed for quite a while. Integration of language teaching and content can be called immersion, content-based instruction (CBI) or content and language integrated learning (CLIL).

Experts who call this integration as "immersion" believes that skills of language, or second language in particular, shall be measured from time to time (Grazer, 1998). Both sides of language and content shall develop hand in hand and both shall be paid attention equally.

The term CBI is the extension of the immersion concept. CBI's proponents call content-based instruction is ideal to make balance of language and concept. The success story comes from Canadian government who suggest English speaking students to take some subjects in French, hence they have to be immersed in classrooms instructed in French (Ramos, 2009: 172). It is a conditioning program which provides students with seamless input. The

students also have to adjust their problem-solving experience in second language setting.

Started in Europe, immersion classes begin to be called content and language integrated learning (CLIL) (Bentley, 2010). The term reflects the willingness of the teachers and policy maker to integrate both content and language. Teachers should have full awareness that content and language shall be treated as a combined module and not to treat them separately.

Some may wonder what the technical differences between language driven classrooms and content are driven classrooms. The following table can help us to understand between both drives.

**Table 1.** Continuum between content-driven and language-driven classroom (Met, 1999).

Content-driven	Language-driven
Content is taught in L2.	Content is used to learn L2.
Content learning is priority.	Language learning is priority.
Language learning is secondary.	Content learning is incidental.
Content objectives determined by course goals or curriculum.	Language objectives determined by L2 course goals or curriculum.
Teachers must select language objectives.	Students evaluated on content to be integrated.
Students evaluated on content mastery.	Students evaluated on language skills/proficiency.

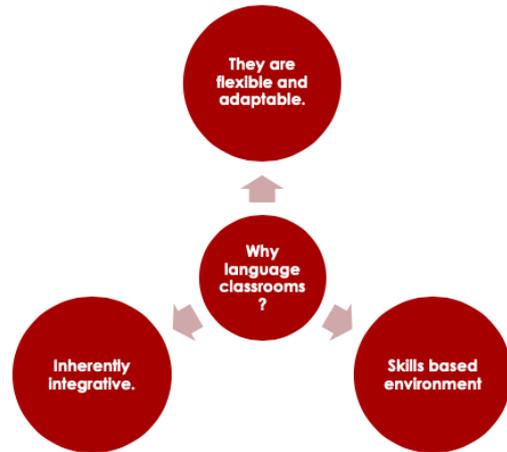
Attention shall be drawn that the table does not exactly explain the differences between two approaches. Rather, the table explains the continuum between content-driven and language driven. Short (1991) argues that in an immersion class, teachers must be aware that students will make a lot of grammatical mistakes and teachers must treat those mistakes as part of learning process. Teachers must also reduce their own talk and give more time to the students to use the language in context and practice. Teachers must give time for students to work together and collaborate with their peers using the target language.

Besides all positive remarks on the use of content-based instruction, there are still some potential adverse points which may arise. Some of the most frequently found challenges in integrated language (Kondatreva and Nazarova, 2015).

- 1) Teachers who have both knowledge and skills in both content and language are not always available.
- 2) Students tend to be overloaded with the integrated contents
- 3) Students and teachers tend to lose balance between language and content.

### III. RESEARCH

My research is inspired by the success of immersion classes in Canada (Grazer, 1998) and Europe (Bentley, 2010). I try to adapt the success of those countries to Indonesia and firstly I would like to test it on my own classrooms. I articulate the belief of why we should integrate second language classroom and science/technological content in the following figure 3.



**Figure 3.** Reasons of Integrating Language Classrooms and Science/Technological Content

I personally think that language classrooms are flexible. We can use different types of methods and approaches to teach language. It is a gift for language teachers to explore unlimited possibilities to enrich their teaching. Secondly, language teaching is inherently integrative. It is impossible to teach language as a separate competency. Teaching language will almost always bring other contents such as: culture, critical thinking, discourse and general knowledge. Thirdly, by nature language classrooms are designed to transfer skills. Those skills can be loaded with other subjects if teachers want to.

**Table 2.** List of topics on Science and Technology integrated in a English Debate Classroom

Meeting	Topics
Meeting 1	DNA and Our Origin
Meeting 2	DNA and Human's Health
Meeting 3	Brain and Human's Personality
Meeting 4	Artificial Intelligence and Human's Future
Meeting 5	The Internet and Social Interaction
Meeting 6	Green Technology and Environment
Meeting 7	Math and the Universe

In this research, I have designed a module combining debate, science/technology and equity and equality. Science and technology content is given seven meeting with the following topics table 2. In order to make this effort measurable, I have prepared pre-test and post-test on three variables: (1) vocabulary mastery, (2) debating mastery and (3) science and technology mastery. The debating class is conducted involving several activities: (1) lecturing, (2) discussing, (3) students' presentation, (4) debating simulation and (5) debating practice. By the time this paper is written, the semester is in progress. The results of the pre-test and post-test also the perception of the students towards the immersion of debate classroom and technological awareness will be reported in the next publication by the author.

#### IV. CONCLUSION

This paper is a report on a preliminary effort of combining debating classroom and technological awareness module. This effort is an attempt to tackle an adverse trending of the declining of science and technological awareness among students. Hopefully this effort will become fruitful in the future. If this model is proven successful, it will pave a way to propagate science through language classroom. It has been discussed in the previous section that the countries' science performances are correlated with per capita Gross Domestic Product. It means that this effort is an effort to improve people's welfare.

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