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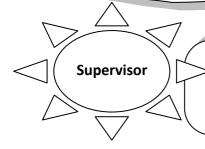
Using a Content and Language Integrated Learning (CLIL) Based Program on Developing Preservice Science Science Terachers' Semantic Awareness

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تاريخ استلام البحث

تاريخ قبول البحث

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Abstract:

This article surveys Content and Language Integrated Learning (CLIL), its history and development. It aims at identifying the effectiveness of using the CLIL approach to enhance semantic awareness for science preservice teachers. Participants of the study were (32) from the science department at Hurghada Faculty of Education. By virtue of its dual focus on language and content, CLIL was utilized in teaching English for science purposes. It discusses Semantic Awareness skills which include students' ability to paraphrase, summarize, write comprehensible sentences and express oneself clearly. The article first focuses on CLIL and its development and widespread throughout the world. While the second part deals with the meaning of semantic awareness. Moreover, the third part demonstrates results and recommendations on the effectiveness of using CLIL to enhance semantic awareness in teaching English for science purposes. Last part of the article discusses learning outcomes of the online implementation of CLIL on preservice science teachers to develop their semantic awareness.

Keywords: CLIL, Semantic awareness, science, preservice teachers

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1. Introduction:

Language is the mean that people use in order to communicate, send, receive and process information. It is the way that through which humanity shares its history and knowledge. Knowledge of a foreign language opens new prospects of mobility and collaboration for professionals in the modern world. Due to the escalating need for English in the world of work and study, ministries of Education started to respond to this huge demand. In this prospect, learning English aims at preparing students to use the language, communicate and interact using it. The role of the instructor is to be responsible for guiding students to recognize which English skills they will need in their future career. An instructor can do that depending on his/her work experience, content knowledge and teaching methods (Belyaeva, 2015).

Since the target of Foreign Language Teaching (FLT) is to use the language, communicative language teaching (CLT) is one of the key approaches in EFL classrooms. Haggag (2019) expressed the view that "Communication as an approach to language teaching emerged since late 1970s and changed the view to class practices and courses. The aim of this relatively new approach is to promote the ability to use language communicatively" (p.264).

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Communicative language approach goes beyond learning how to speak the language but to interact as well (Adi, 2012). This would in turn create a link between language and action. Heng (2014) further claims that CLT is based on the premise that language is a means of communication and therefore the main goal of learning a language is to be able to communicate effectively and appropriately.

The current study suggests a CLIL-based program that is considered to be one of CLT approaches. CLIL is a term that refers to content and language integrated learning. According to March (2002) CLIL is an approach that depends more on knowledge, interaction and communicating using the target language which in turn leads to a better acquisition of the target language. CLIL as an approach focuses at creating a variety of learning situations and activities to provide more coverage of the subject matter along with the use of the target language. CLIL as an approach creates a kind of extra space that enables specific forms of methodology to be used to achieve goals not attainable within a time and resource-restricted language-learning slot within a curriculum. These methodologies evolved into a form of education, which surpasses 'language learning', taking place in forms of 'integrated language acquisition-rich' learning environment. "CLIL as an approach leads to exploring

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and recognizing its innovative ability that surpasses the traditional approaches to both subject and language teaching" (March, 2002, p.244).

Since CLIL is one of the approaches that is explicitly used for both content and language learning, it is used in the current study to develop further science and language skills. Next section deals with CLIL and Semantic awareness related literature and theoretical framework.

2. Theoretical framework

Content and Language Integrated Learning (CLIL)

Content and language integrated learning (CLIL) as an approach to course design emerged in the 1990s by David March. This decade has been considered that of 'teaching and learning through a foreign language' (Marsh, 2002, 54). The term was coined in 1994 and launched in 1996 by UNICOM, the University of Jyva skyla (Finland) and the European Platform for Dutch education (Fortanet-Go´mez and Ruiz-Garrido 2009; Marsh 2006). Since then and especially in the late 1990s, CLIL was considered a "growth industry" as its usage started to increase (Marsh, 2002, 59). From

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2003 onwards, as Dalton-Puffer and Nikula (2006) document, international researches on CLIL started to arise.

CLIL is a term that refers to Content and Language Integrated Learning. It was developed through decades till it is recently in Egypt. Egypt is one of the countries where English is taught as a foreign/second language. English is used to teach science, social studies, history, geography… and mathematics in many schools all over Egypt. Hence, students find themselves in a situation in which they are not only being asked to understand but they need to interact and communicate with the instructor as well using English the medium of instruction.

Bilingual and multilingual graduates are recently needed more than before since the labor market currently is giving interest and privilege to graduates who can communicate and interact with a second language which justifies the escalating demand of having another language other than the first language (L1). However, that does not underestimate and neglects L1 but in CLIL approach, a good deal of L1 is required and supported.

Students usually need to communicate with the instructor in order to ask about a piece of information or to answer a question or both of them altogether. Without the knowledge that would enable

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them to use the language, students will face one of these two options. The first is to use their mother tongue (L1) in asking and answering questions. The second is to remain silent, afraid to interact. In both cases, students will be losing an opportunity to learn both content and language or in other ways learning through practice. "CLIL is a coherent way of doubling the amount of exposure to the language, without the necessity of adding more room in the timetable for language (only) lessons" (Bonces, 2012. p.183). Through the immersion between content and language, language will be learned incidentally as a natural part of being intensively exposed to the second language.

Pérez (2011) expresses the view that CLIL is different in terms of introducing a new whole concept to the educational bilingualism. It appeared in that specific time where there is a huge need for language learning. Lorenzo (2007) claims that during the 21st century many countries adopted CLIL because it proved its effectiveness as a successful attempt that depends on a theory of learning. Thus, a lot of attention is directed to CLIL as it is distinct from any other type of bilingual programs. CLIL is considered to be an increasingly acknowledged trend in foreign language (FL) teaching.
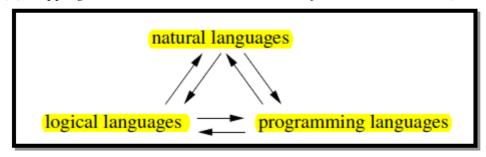

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Semantic Awareness

Semantics is a broad term that is used in different field. It is used in linguistics, philosophy, and computer science. Its meaning differs according to the context it is used in. in linguistics, semantics is "a component of grammar which derives representations of meaning from syntactically analyzed natural surfaces". In philosophy, semantics "assigns set-theoretic denotations to logical formulas in order to characterize truth and to serve as the basis for certain methods of proof". While in computer science the term semantics "consists in executing commands of a programming language automatically as machine operations" (Hausser, 2014. p. 359).Three kinds of language resulted in Hausser's three kinds of semantics as shown in Figure (1).

Figure (1)

Figure (1) Mapping relations between the three kinds of semantics. Hausser (2014). p. 362

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Figure (1) clarifies the nature of language required based on the field it is used for. Philosophy-related semantics deals with logical languages, while computer science-related semantics deals with programming languages, whereas linguistic-related semantics deals with natural language. As natural language is the common language used for communication, this study focuses on meaning issues in natural language. A good knowledge of semantics contributes a great deal to students' vocabulary building and production of a meaningful language. Semantics help learners make sense of everything they encounter in their regular life. It is what pushes someone to say "I do not get it, it does not make sense". If content is not conveyed in such a comprehensive manner, students will not be able to process and understand its meaning or the purpose behind it.

Meyer (2010) in expressing the importance of meaning and authenticity in Second Language Acquisition (SLA) stresses that there are three main criteria when it comes to selecting classroom materials. He called them Meaningful, challenging and authentic. He asserts that "SLA studies have shown that meaningful and challenging input is one of the main pillars of foreign language acquisition. Classroom content should be meaningful in a sense that it focuses on global problems mankind faces". (p.13). That indicates

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how important it is having meaningful tools and materials that would in turn lead to SLA.

In that sense, Dupuy (2011) argues that with the rise of globalization, meaning is made in different shapes and ways as the world has become interconnected as never before. "New communication technologies are not only making it possible to exchange information broadly and quickly but are also allowing meaning to be made in increasingly multimodal ways". p. 21.

Alsayed (2019) confirms the importance of semantics in terms of word meanings, references, senses, logic and perlocutions and illocutions. Semantics promotes students' understanding and comprehension skills as it increases their awareness of meaning and the relationships between words. Furthermore, semantics can also "enhance the student's ability to learn vocabulary effectively and then employ this knowledge in the social/interactional context appropriately". p. 14.

In order to use the second language, knowledge of vocabulary, grammar, and culture of the target language is required. "Scholars and researchers set a massive amount of research to acquire the semantics of second language words. These

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constructions of semantic hunt help learners increase their vocabularies and build a bridge between the new words and known words" (Aajami, 2019. p.117)

Learning outcomes in the CLIL online instruction and digital competences

In the 21st century, students need to acquire more skills to cope with the digital transformation that the world witnesses. Since March 2020, all people around the globe found themselves in a situation in which they must work, study and communicate online. Without a prior knowledge of how to use software and digital devices, it would be enormous chaos. Students around the world were in a situation that they need to learn and study but there was not enough preparation for that due to the Covid-19 pandemic that shook the world leaving people in a completely bad condition. Authorities have to pave the way to offer more opportunities to study and learn online. Content and Language Integrated Learning (CLIL) encourages participation and communication among students which require teachers with more potentials to do that online. Teachers need to work on their own tools in order to help students cross this stage unharmed.

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In the CLIL contexts, O'Dowd, (2018) demonstrates that "online communication technologies have great potential for supporting the development of students' foreign language skills and intercultural competence, and for increasing understanding of subject matter". p.1. Designing online task-based projects would have a great motivating and innovative impact on interaction under the supervision of teachers. In one hand, students will learn content and language. On the other hand, they will develop further digital competence skills.

However, numerous students have smart phones devices and laptops. They use them for multiple purposes and because this is one part of students' live after the school, it will not be hard for teachers to get use of that. "Teaching a subject in English must provide students with the right strategies, conceptual maps and schema which lead to successful learning. Nowadays, this cannot be done without the use of ICT" (Plácido & Sergio, 2018. p.154). ICT is a term that refers to Information and Communication Technologies. The nature of the contemporary world imposes on individuals to place a good understanding of digital techniques and methods especially in the educational field. Another recent common term is ICT literacy. It refers to "using digital technology, communications

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tools, and/or networks to access, manage, integrate, evaluate, and create information in order to function in a knowledge society." (Panel, 2002. p. 2).

Figure (2)

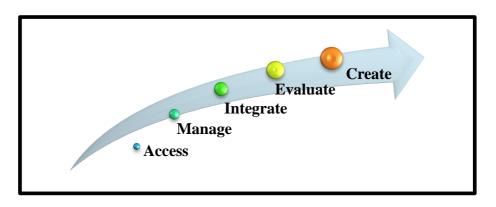*Five critical components of ICT literacy*

Figure (2) shows the five critical components of ICT literacy that can be inducted from the above definition. First: Access; it refers to the ability to find and retrieve specific information. Second: Manage; it deals with sorting out data, comparing them and relating between them. Third: Integrate; it focuses on one's ability to summarize, select and paraphrase. Fourth: Evaluate; refers to judging usefulness of sources. Fifth: Create; deals with designing and applying information.

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These five components are interwoven together to show levels of competence that students need to reach. In applying the previous model on a CLIL lesson, a teacher should be able to assign tasks that help students move from level one (Access) to level five (Create). For instance: The teacher may assign a task about solutions, as following:

Table (1)

Designing a CLIL task according to the five components of ICT literacy.

First step	To **access** suitable online resources about solutions.
Second step	To **manage** information according to their importance and to sort them out into definition, types of solutions, properties and examples.
Third step	To **integrate** information by summarizing to get the main idea, to paraphrase and use their own language in expressing and writing about solutions.
Fourth step	To **evaluate** the righteous of information through comparing different resources about solutions and identifying facts.
Fifth step	To **create** a presentation about solution, designing a mind map or a semantic map, writing an article, doing an experiment.

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The table above highlights a CLIL task that can be done online. The model table explains the steps with giving examples of the work that is required in each step. In that sense Irvin, (2007) claims that "Technology is the portal through which we interact with information, but people's ability to handle information to solve problems and think critically about information tells us more about their future success." p. 50. Plácido & Sergio, (2018) confirms the same notion that "CLIL methodology needs authentic tasks that can be done in a cooperative way by using ICT purposefully." p.155.

3. Aims of the study:

3.1. Identifying the history and development of Content and Language Integrated Leaning (CLIL).

3.2. Recognizing the meaning of Semantics as a component of language.

3.3. Reporting the effectiveness of using the CLIL based program on preservice science teachers' semantic awareness.

3.4. Discussing results of the study and reporting recommendations for further research.

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4. Questions of the study:

The article attempts to answer the following questions:

4.1. How to design a CLIL based program in the light of the literature review?

4.2. What is meaning of Semantic Awareness?

4.3. What is the effect of using a CLIL based program on enhancing the Semantic Awareness for preservice science teachers?

5. Method of the study:

Methodology of the study includes participants of the study and design of the study as explained below:

5.1. Participants of the study

The study was conducted on one group of participants where (32) students from the second year, faculty of education, science department went through a pre-test of semantic awareness. A post-test was applied after participants were exposed to the training program. The target sample included both males and females of almost the same age.

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5.2. Design of the study

The study utilized a one-tailed quasi-experimental group design with pre and post testing of Semantic Awareness. Program of the study was applied online due to Covid-19 pandemic.
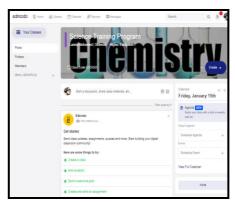
6. Materials and tools:

In order to investigate the effectiveness of the CLIL based program on Semantic Awareness, the following tools were utilized:

Writing and presentation software

Software that allows students to work with documents and presentations. During the implementation of the program, students utilized Microsoft office, notepad and power point presentations.

Edmodo platform:

Acts as a virtual classroom with some interesting tools. Students used it to comment, share assignments, view materials, send and receive messages, submit quizzes and assignments.

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Youtube:

A website and application that enables students to find enormous amount of videos about specific topics with different languages. Students used it when they were asked to watch an experiment about solutions and types of solutions. Then they were asked to share the information they have combined. Students reacted enthusiastically as the video was appropriate for their language level.

Whats app:

A common application that is used to send and receive text and audio messages, links, files and videos. Students used it to interact, communicate, send the meeting link each time to remind each other about the daily zoom meetings.

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Zoom meetings:

An application that can be used for android, iOS and windows. It serves as a communication channel. It was selected because students were familiar with it at that time (Covid-19). Students used it to speak, present, ask and answer and sharing their own screen while presenting.
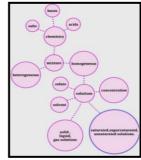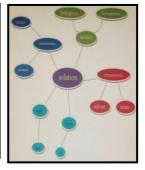
QR Code:

A QR code was developed to overcome problem related to the passkey to the Edmodo class, so I created this code so that students scan it and get access right away.

Mind maps and semantic maps creator:

Students were asked to design a semantic or mind map and they looked for applications to help them do the task easily and in a shorter time.

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Google forms:

7.

An online service from Google that provides access to ready forms and templates. They are easy to use and students were familiar with them. They used them to submit their answers for both the test and the scale in the pre post testing of semantic awareness and attitudes scale.

7. Results:

Results obtained from the study indicated the usefulness and effectiveness of using the CLIL-based program in acquiring some basic language skills and content knowledge. Second year students at science department at faculty of education were taught chemistry in English. The study aimed at providing students with basic scientific terms and idioms related to chemistry in addition to enhancing and improving their linguistic skills. Semantics is considered as an essential part of linguistics that gives interest to

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meaning. Accordingly, the proposed program contained items, questions, activities, videos and learning materials that would help students improve their paraphrasing, rewriting, summarizing and interpretation skills. Students were also taught to use semantic maps to easily remember the main topic and supporting details in addition to finding word relations. During the training program, students developed their spoken language skills through interaction and communication channels. Communication in the CLIL based program was never limited to the teacher-leaner channel, furthermore, learners held conversations and discussions with each other as well. They were asked to ask and answer each other without judging their language competence.

Participants felt comfortable interacting with each other in such a supportive atmosphere. Their comments included some demands for more sessions as they were not only learning content knowledge but they are gaining some essential language skills.

8. Discussion and interpretation of the results:

The present study led to the following findings:

- The proposed content and language integrated learning (CLIL) based program proved to be effective in enhancing

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semantic awareness for second year science preservice teachers.

- Participants` reflections after being exposed to the proposed program were completely positive and encouraging.

Results of the study were supported with earlier studies in the field. Many studies adopted CLIL approach proved similar results to the current study. The current study is consistent with Tzoannopoulou (2015) who found that:

> A general reflection on the experience it could be noted that the implementation of CLIL-based activities seems to contribute to the course objectives and to enhance student motivation. Furthermore, it seems that learning becomes more effective as students are more engaged in real-life tasks and work collaboratively to produce pieces of work that the professional community expects. On the whole, it appears that ESP courses would benefit from the implementation of the core principles of CLIL." p. 153

Marsh (2013) asserts that the feature of immersion in CLIL leads to its great success in different contexts with any language other

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than the mother tongue. While Lo (2019) agreed that teachers who were taught through CLIL have significantly changes their beliefs and developed more language awareness.

9. Conclusion:

The article discusses the theoretical basis of CLIL and Semantic Awareness. it also proposed a CLIL based program. It identified the effectiveness of the program in addition to investigating its effectiveness in improving semantic awareness as a part of linguistics. Content and Language Integrated Learning (CLIL) was utilized as an independent variable to improve participants' semantic awareness. Results of the study were obtained through SPSS. Results were promising and confirmed the significance of the CLIL approach in improving some participants' semantic awareness skills such as paraphrasing and summarizing. Students utilized synonyms and antonyms very frequently in implementing and practicing paraphrasing. Students were found to improve more presentation skills as they were permitted to share and discuss their ideas all the time. Participants' scores in the post testing surpassed their scores in the pre testing due to the teaching through the CLIL based program. It proved to be appropriate in developing both

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content and language skills. Results indicated that CLIL provided students with more confidence and motivation to learn through the second language. CLIL students acquired further language skills which were clear in their discussions and presentations. Results of the study also highlighted the need for strong science training programs to support students' academic and linguistic progress.

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