THE FREQUENCY AND FUNCTIONS OF TEACHERS’ USE OF MOTHER TONGUE IN EFL CLASSROOMS

Ngo Bich Ngoc1, Phuong Hoang Yen2, Ph.D
1Can Tho Medical College, Vietnam
2Can Tho University, Vietnam

Abstract:
Whether mother tongue should be used in EFL classroom or not is a controversial issue and has not yet reached a consensus among teachers and researchers. While some argue that the use of mother tongue inhibits language learning, others claim that it saves time and energy for both language teachers and students and enhances mutual understanding between them. Although a number of studies explore the use of mother tongue in EFL classrooms, few have been conducted to investigate how often teachers in non-English major classes code-switch, that is, change from English to mother tongue and why they do that. In such a context, the current study examined the use of code-switching by teachers in EFL classroom in a medical college in Vietnam by means of classroom observations and voice recording analysis. The findings revealed that in teaching English to nursing students in this medical college, the teachers did code-switch to a great extent for the main purpose of enhancing their students’ English comprehension and competence. Suggestions are proposed to raise EFL teachers’ awareness on how and when to code-switch so that their teaching can be optimized.

Keywords: use of mother tongue, code-switch, functions, EFL teachers

1. Introduction

The use of mother tongue or code-switching in EFL classroom is a common phenomenon in countries where two languages or bilinguals are spoken. Many researchers have exposed different definitions of code-switching. With reference to Weinreich (1953), code-switching refers to the switch between two languages and number of empirical studies has investigated teachers’ and partners’ use of code-switching and learners’ use of code-switching. On the one hand, code-switching facilitates teachers to clarify vocabulary, and motivate students to speak English as well as facilitated learners to speak English (Cipriani, 2001). In addition, Bergsleithner (2002)
believe that code-switching can promote learners’ grammar comprehension in a pre-intermediate EFL classroom. Some recent studies indicate that code-switching is beneficial to learners in language learning process. Noori and Rasoly (2017) revealed that teachers code switch the languages for explaining difficult concepts, explaining grammatical points, giving instructions and clarifications. Recently, Leananak and Amalo (2018) claims that code-switching helps EFL teachers to explain difficult words, manage and organize the classroom and motivate students’ participation. On the other hand, drawbacks of code-switching should not be ignored. Malik (2010) indicated that the awareness of limitations of code-switching should be made by teachers and learners. Long-lasting use of code-switching can be harmful for learners’ target language acquisition. The right awareness of code-switching and bilingualism impact positively when planning for bilingualism education. It was believed that there was a hesitation whether teachers should use mother tongue (L1) or it should be banned in teaching foreign language in EFL classrooms. In Vietnam, this phenomenon is also a controversial issue. Because of different purposes, Vietnamese teachers tend to switch from English to Vietnamese in their classrooms and vice versa. In case of teaching in my college, it is normal that there is the mixture of using L1 as Vietnamese and L2 as English in the classroom. This paper refers to the percentage of native language as Vietnamese medical college EFL teachers use in their classrooms and the functions of teachers’ code-switching in the classrooms. More specifically, the study aims to answer the two following research questions:

Q1: What percentage of native language as Vietnamese do medical college EFL teachers use in their classrooms?

Q2: For which functions do these teachers code-switch in their classrooms?

2. Literature review

2.1 Definition of code-switching

Scholars and researchers have had different perspectives on the study of code-switching. In the past few decades, code-switching is defined as “Going from one language to the other in mid speech when both speakers know the same two languages” (Cook, 1991, p.63). Myers-Scotton (1993) argues that code-switching happens when bilingual or multilingual speakers have the choice of structure from two or more linguistic variation in the same dialogue. Additionally, code-switching was defined as the combination of two languages in the same utterance or dialogue (Heller, 1988).

In recent years, according to Myers-Scotton (2001), code-switching was considered as the repeated occurrence of two or more languages in the same conversation or statement that is used both in schools and outside schools. Heredia and Brown (2005) defined code-switching as a strategic tool to help speakers succeed in dealing with difficulties in conversations. Indeed, code-switching was the bilingual alternation between languages when speakers were not able to achieve the proficiency in both languages for the task. They may tend to switch or mix the addressed language
with the first language in communication. In this study, the term of code-switching is defined as the alternative usage of two different languages in bilingual settings.

2.2 Functions of code-switching
Myers-Scotton (1993) identifies five main functions of code-switching: (1) Interpretation and clarification of subject, (2) evaluation of comprehension, (3) affirmation and stimulation of participation, (4) management, and (5) humour and sign of bilingual identity. This study adapts perspectives of Harmer (2007), Tang (2002), Schweers (1999), and Myers-Scotton (1993). They agreed that instructors often code-switch for different functions in total namely interpretation and clarification of subject; explanation of complex grammar points, phonology, cross-cultural issues, and spelling; explanation of complex ideas; evaluation of comprehension; management; saving class time, as a substitute for a lengthy explanation in the target language; Affirmation and stimulation of participation; passing on meaning through providing the L1 equivalence through translating L2 items or sentences; humour and sign of bilingual identity; explanation of errors.

2.3 Benefits and drawbacks of code-switching in EFL classrooms.
Code-switching is the common language teaching phenomena in EFL contexts. The phenomena exist in bilingual contexts, especially in EFL classroom in which EFL teachers tend to have an alternate use of two or a variety of languages because of some advantages of code-switching. One advantage of code-switching is to guarantee learners’ comprehension in the classroom to facilitate them to fill their limit in language competence in target language. Centeno-Cortés (2004) supposed that teachers use L1 to help students to be more comprehensible in their learning process. Additionally, low-proficiency learners used their mother tongue (L1) much more than learners with better L2 abilities. Similarly, code-switching by teachers assists students with comprehension, language proficiency in learning settings (Selamat, 2014).

Another advantage of code-switching is supporting grammar instruction. Obviously, it is stated that using code-switching, learners can communicate with their teacher and promote learners’ grammar comprehension in a pre-intermediate EFL classroom (Bergsleithner, 2002). Johansson (2014) indicates that teachers attempted to use code-switching as little as possible from the study. Code-switching by teachers was used in some situations including grammar instruction, test instructions and in one-to-one situations.

Third, code-switching is claimed to improve explanations and maintain disciplines in the classroom. Chowdhury’s (2013) study stated that teachers tended to code-switch for communication, explanation, maintaining discipline in the classroom. Code-switching by teachers was used to manage classroom discipline, to respond when students gave complaint, to explain clearly, when they introduced the new lesson, topic, concept or term and to communicate with students effectively. If there was the help of controlled code switching, students would acquire proficiency in English. Students had a positive attitude towards it.
Another benefit is to build interpersonal relationships with learners. In view of this benefit, Keong et al (2016) indicated that 20 teachers teaching English as a foreign language (EFL) in primary level schools in Kurdish of Iraq had positive attitudes toward using code-switching. English was used as the medium instruction and Kurdish as L1. To collect data, the author examined through questionnaire and interview regarding to the teachers’ use of code-switching in their classroom. The study showed that using code-switching by teachers concentrated on three main functional categories to access curriculum, manage classroom discourse, build interpersonal relationships with learners, convey the information and instruct students.

Last but not least, code-switching can help teachers save time and bring students’ interest in learning. Bensen and Çavusoglu (2013) found out the use of code-switching by four teachers of English in EFL classrooms in the English Preparatory School of a private university in North Cyprus.

The result showed that purposes of switching the languages are to make meaning more comprehensible, save time and create students’ interest in learning. Nevertheless, they strongly agreed that using code-switching would be effective in the case of assisting students to pass specific language proficiency exam related to grammatical points in limited time. Generally, those researchers believe that the advantages of applying code-switching outweighed disadvantages in EFL classroom.

In the light of these advantages, there were some studies emphasizing on the other aspect of code-switching. The main disadvantage of code-switching is obstructing learners’ ability of language acquisition. According to Eldridge (1996), using the native language (L1) can hinder learning the target language in classroom. Another disadvantage of this phenomena, learners cannot maximize their ability of exposure in target language. Nonetheless, Harmer (2007, p.134) also mentioned detriments in using the pupils’ L1. One of the disadvantages discussed is the fact that the usage of pupils’ L1 limits TL exposure. Code-switching by teachers causes some problems for learners in language learning process. Therefore, teachers need to be concerned and should raise awareness about code-switching in their classroom.

### 2.4 Code-switching in Vietnamese EFL Classrooms

Using mother tongue (L1) in teaching and learning target language (L2) is unavoidable in EFL classroom. Teachers tend to switch for various pedagogical purposes. In the educational context of Vietnam, the relation between Vietnamese and English code-switching has been explored in some current articles. In reality, only use of English as a target language in EFL classroom by teachers has been facing challenges. In case of students, they may be lack of motivation, autonomy, low level of English competence or even other affective factors. In case of teachers, there can be the limit of English abilities and inappropriate teaching methods. Additionally, using Vietnamese-English code-switching is not banned in teaching and learning settings. According to Nguyen (2006), teachers of English code-switch to make new word and grammatical rules clear, provide feedback for students, check students’ comprehension, consolidate the relationship between teacher and students and create friendly classroom environment.
Bui and Vu (2017) revealed that it was vitally important to use code-switching in teaching in their context of teaching English to Lao students learning in Vietnam. Code-switching among English, Vietnamese and Lao facilitated students to achieve English proficiency for Lao students. However, the author suggested that using code-switching should be limited for learners with advanced level of English proficiency.

In conclusion, it is inevitable and natural to code-switch between the mother tongue and the target language in bilingual classroom. It is a controversial issue whether code switching should be avoided or not in teaching and learning process. Some teachers believe that using L1 in EFL classroom may hinder learners’ the target language L2 competency. On the other hand, the others suggested that using L1 can help teachers in explaining difficult items, managing the classroom or build good relationship with students. In the context of Vietnam, it is common to integrate Vietnamese and English in classroom instruction. It is believed that code-switching by teachers has some various purposes and what extent should teachers use code-switching in EFL classroom in case of medical college in Can Tho city, the context of the current study.

3. Methodology

3.1 Research design
The current study is designed as a descriptive study with the qualitative method. Qualitative is procedure research with descriptive data in forms of written words or saying words from people who can be observed (Zuriah, 2006: 92). The researcher plays an important role as non-participant researcher to observe directly, collect the data from recordings and take notes in classroom. In the current study, data were collected through classroom observations, audio-recordings and interviews. Based on the classroom observations and audio-recordings, the use of code-switching by teachers was revealed within EFL classrooms at a medical college in Vietnam. The functions which teachers’ code-switch in EFL classroom were figured out through interviews.

3.2 Participants
Five teachers of English at medical college in Vietnam participated in the study. All of them have been teaching English as a foreign language at medical college for 8 to 10 years. Among them, two teachers obtained TESOL master degree, other three teachers have been following master program in teaching principle and methodology in Can Tho University. English is taught as a compulsory subject in the first year of college. They are teaching English for first-year students majoring in Nursing within 120 periods. The material including 12 units is composed for internal use only and taught during 120 periods. The syllabus that the teachers are following is provided by the college.
3.3 Instruments

3.3.1 Classroom observations
An important contribution to descriptive research is direct observation. Certain types of information can best be obtained through direct examination by the researcher (John W. Best, 1981, p.158). The researcher observed what teachers delivered to students by code-switching. The observations were employed and based on theoretical frame work of Clara Herlina (2007). The amount of native language used by teachers was analyzed to find out the percentage of L1 use in the classroom. The study analyzed the speech of the teachers to find out the percentage of code switching.

3.3.2 Interviews
Five lecturers were interviewed individually related to their use of code-switching in the classroom in order to clarify the purpose of using it. The interviews are recorded by digital voice-recorders and lasted 30-45 minutes each. The interview is designed in both English and Vietnamese and elicited if the participants cannot provide the appropriate answers. Finally, the interviews are transcribed to find out the answers from research questions above.

3.4 Procedure
Classroom observations and interviews were employed in this study. First, in the classroom observations, designing observation sheets was performed within 2 weeks. The researcher came to the class to observe 5 lecturers teaching in total of 5 pharmacy classes during 3 weeks. Each class was observed and recorded within 45 minutes. The researcher was considered as non-participant observer in the classroom. The researcher allowed to sit in the classroom observed teachers’ lectures through an audio-recorder to find out what percentage teachers code-switched in the classroom. During the observation, the researcher took note on code-switching between English and Vietnamese happening in teachers’ speech. Later on, teachers’ speech was transcribed and analyzed to find out the amount of L1 the teachers used in the classroom. Then, the interviews were conducted individually to explore teachers’ purpose of code-switching in the classroom. The interviews lasted 30-45 minutes each and were all recorded. The interview was conducted in Vietnamese and interviewees were elicited if there were any confusion or hesitations. Finally, the interviews were transcribed to find out the answers to the research questions above. Transcribing and analyzing the data from the interview were carried out within 1 week.

3.5 Data analysis
The method of data analysis of the study is descriptive analysis. The descriptive data was collected from classroom observations. The researcher came to the 5 classes belonging to Pharmacy major and listened to what teachers say in the classrooms. The Vietnamese and English words were listed to determine the percentage of using L1 out of the total number of words used by the teachers in classroom. In addition, the
functions of teachers’ code-switching were identified from the data collected from the classroom observations and teacher interviews.

4. Findings and Discussion

4.1 Findings

4.1.1 Teachers’ code-switch

The results of data analysis revealed that the teachers in the current study did not use English most of the time. In particular, the teachers’ use of native language as Vietnamese can be varied, as can be seen in Table 1.

<table>
<thead>
<tr>
<th>Teachers</th>
<th>Number of words used in 45 minutes?</th>
<th>English words</th>
<th>Vietnamese</th>
<th>Percentage of code-switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>1,699</td>
<td>792</td>
<td>907</td>
<td>53.3%</td>
</tr>
<tr>
<td>T2</td>
<td>681</td>
<td>313</td>
<td>368</td>
<td>54%</td>
</tr>
<tr>
<td>T3</td>
<td>726</td>
<td>583</td>
<td>143</td>
<td>19.7%</td>
</tr>
<tr>
<td>T4</td>
<td>625</td>
<td>463</td>
<td>162</td>
<td>25.9%</td>
</tr>
<tr>
<td>T5</td>
<td>858</td>
<td>662</td>
<td>196</td>
<td>22.8%</td>
</tr>
</tbody>
</table>

The number of words listed in the second column of Table 1 is the total words spoken by each teacher within 45 minutes of observation. It is obvious that the number of words spoken by different teachers varied within the same amount of time. These differences result from different skills, methodologies and activities that each teacher used in their classrooms. It is noticeable that while Teacher 1 spoke totally 1699 words, Teacher 4 only uttered a total of 625 words in his 45-minute lesson. There are several explanations for this issue.

During T1’s class, she taught reading skills and asked her students to complete the tasks of 2 passages. In Passage 1, she required students to find out which statements were probably true and gave explanations. At the end of Task 1, she asked some questions to check students’ comprehension. On the other hand, in Task 2, students were required to fill in the blanks with the suitable words and asked to translate the article line by line. She spoke at least 20 minutes, and the rest of the time was for students’ discussion and students’ task completion. In T5’s class, the reading skills were also being taught. The tasks of reading of T5 was the same as the tasks of reading of T1 including check true or false and fill in blanks. However, the differences were the activities. T5 focused on explaining some key words of reading text and translated some main ideas related to task without translating all the text as T1 did.

In T2’s lesson, writing skills were being taught. T2 spoke from 20 to 25 minutes to elicit the ideas and provide vocabulary, grammatical structures and format of a paragraph for students to write. In addition, T2 asked students to discuss and correct ideas given by their peers on the board for the rest of time.

T3 taught listening skills and he spoke only 15 minutes for eliciting ideas before listening and providing key words for students to listen. In fact, playing the audio
recording occupied at least 15 minutes. Especially, T4 taught speaking and reading when teacher’s and students’ speech were recorded. In this case, the conversation between teacher and students lasted 30-35 minutes.

4.1.2 Teachers’ general views on code-switching
The percentage of code switching was calculated by counting the ratio of Vietnamese words against the total words spoken by the teacher. The last column in Table 1 showed the from 19.7 % to 54% of Vietnamese over the total words that teachers spoke in classrooms. On the whole, three teachers code-switched from 10-30 % (T3,T4, T5), and the other two teachers performed code-switching for more than 30%, which reveals that most teachers used a small amount of code switch when they were teaching. However, they still used native language as Vietnamese in their presentations. With regard to the perception of code-switching, all respondents have positive perceptions toward code-switching. Five out of five participants (100%) understood what code-switching is. The respondents said:

“To me, code-switching is the alternation between 2 languages including native language as Vietnamese and foreign language as English in classrooms.” (Teacher 1)

“Code-switching” refers to the bilingual use including Vietnamese and English in language teaching. There is the combination of Vietnamese and English when teaching English” (Teacher 2).

When being interviewed about the functions or the purposes of teachers’ code-switching, code-switching was used to give feedbacks. One of the respondents responded:

“Right, I can give correction in English when the error is simple, or easy. However, I use Vietnamese for explaining seriously difficult” (teacher 1)

The respondents T1, T2, and T4 agreed that they code switched to explain instructions to encourage students’ comprehension in order to complete the tasks.

“For teaching listening skills, I tend to use Vietnamese to give explanation about the instructions of the listening task. However, I ask them to stand up to give the answer in English because they have already understood the instructions given. Therefore, students can complete the task. For teaching grammar and writing, I use Vietnamese to explain and help them obtain the knowledge and understand the instructions of the tasks” (teacher 1).

“I often explain the instructions in both English and Vietnamese, but I give explanation for hard instructions in Vietnamese” (teacher 2)
“I use Vietnamese to explain instructions to make sure that students are able to understand the tasks and complete the task effectively” (teacher 4)

Respondents T3, T4, and T5 agreed that they code switched to explain hard word or terminology. They said:

“In medical field, it is hard for students to understand medical terminology and reading text. So teachers find it necessary to explain them in Vietnamese in order that students are able to obtain their comprehension easier” (teacher 3)

“I definitely use Vietnamese to give explanation of medical terminologies” (teacher 4)

“To explain hard terminologies, using the mother tongue helps students get deep understanding” (teacher 5)

To create humour by code-switching was referred by T2, T3 and T4. They stated:

“As I realize how tired and neglectful my students are, I may tell funny stories for them to make classroom amusing” (teacher 2).

“Sometimes, using Vietnamese creates fun for the atmosphere in the classroom through telling them funny stories, situations in order that students obtain the comprehension in learning process” (teacher 3).

“I usually tell funny stories in Vietnamese to make the atmosphere of classroom more interesting” (teacher 4)

Most respondents code-switched to explain complex grammar and manage their classroom.

“I employ Vietnamese to explain grammatical structures and provide more examples so that they can apply those structures in specific situations and complete the tasks” (teacher 1)

“I use Vietnamese for explain complex grammatical structures and English for simple structures” (teacher 5).

“I warn some students about their neglectfulness in the classroom in Vietnamese” (teacher 4)

“I use Vietnamese to manage my classroom when some students make noise and give them some real contributions” (teacher 2)
Besides, T2 also refers to the humour and cross-cultural issues in the classroom. She said:

“Especially, when students have a chance to read the text about the types of nursing positions in UK. The reading text mentions the grades of nurse there while it is different from Viet Nam. I tell them the differences between the grades of nurse in Britain and Vietnam in Vietnamese. I make decision to explain those cross-cultural differences in Vietnamese. For example, there are 4 grades of nurse including nursing officer, charge nurse, sister, staff nurse and auxiliary nurse in UK while we only have nursing officer and nurses in general. I will emphasize those differences to help them understand and retain the lesson better.”

Most of them reported that the use of English and Vietnamese affect students’ English learning. They agreed that code-switching tended to bring positive effect on students’ target language acquisition especially lower level students. When being asked if switching to the native language in some cases can be beneficial to the students’ language acquisition, five participants definitely agreed that they had both advantages and disadvantages of switching to the native language as Vietnamese because most students are at lower level. One of the respondents said:

“I supposed that we considered English as a foreign language. When I speak English only most of the time, it is definite that students cannot understand all information that I provide. It is necessary to switch into Vietnamese to facilitate students in catching meaning of hard words and complex grammatical structures. Therefore, students can be confident to achieve the target language acquisition” (Teacher 1).

Disadvantages are also referred by most of participants. It is popularly believed that using Vietnamese should be limited in classroom to maximize learners’ language acquisition.

“Students lose the habit of listening to English. Therefore, the ability of interaction with other people in English will be decreased. They attempt to translate word by word in English and vice versa” (teacher 2).

“Students cannot concentrate on listening teachers’ speech in English. Indeed, they focus on teacher’s speech in Vietnamese only. Consequently, their reflection becomes worse” (teacher 3).

4.2 Discussion
The current study revealed that code-switching is a common language teaching phenomenon in the EFL context of the current study. Teachers of English indicated that there are different functions of code-switch in EFL classroom. The results of the current study are in line with the hypothesis and the results of the previous studies (Harmer,
2007; Tang, 2002; Schweers, 1999; and Myers-Scotton, 1993). The study reveals that teachers tend to code-switch from English to Vietnamese for different functions including explaining complex grammar points and cross-cultural issues, explaining complex ideas, evaluating comprehension, managing classrooms, passing on meaning through providing the L1 equivalence through translating L2 items or sentences, giving humour and explanation of errors. These are considered enough to represent the functions of code-switching in the classroom. The amount of native language is used more than the amount of English in the case of teaching grammar. For listening and speaking, teachers should maximize English as much as possible to promote learners’ English proficiency.

Additionally, from the interview data, most teachers admitted that they code-switched the language to provide explanation about complex grammar, complex ideas, hard words. Moreover, they also referred to code-switching to create a comfortable atmosphere in learning English for students. Using L1 plays a crucial role in controlling the class, giving feedback and explaining cross-cultural issues easier. Indeed, code-switching is considered as an effective tool in teaching low-proficiency students in EFL classroom. Almost all teachers completely agreed with the benefits of code-switching in the classroom. However, it should not be exceeded and needs to be limited to promote learners’ language acquisition. It was in line with Noori and Rasoly (2017) and Habbi (2017). Indeed, the result of the study demonstrated that EFL lecturers presented the positive perception of code-switching. The purposes of using it were for explaining difficult concepts, explaining grammatical points, giving instructions and clarifications. They believed that exceeding code-switching in classroom should be limited (Noori and Rasoly, 2017). Furthermore, Habbi (2017) also examined the functions of teachers’ code-switching in EFL classroom. It was indicated that using code-switching by teachers was considered as a helpful tool in the classroom. Students tended to manifest positive attitude towards CS in the class. However, overusing CS by teachers was not supported because students needed to expose English as much as possible. Functions of using it were for clarification, translation and creating sense of belonging.

In this study, the teachers also mentioned some disadvantages of using L1 in the classroom consisting of losing students’ ability of reflection when they learn foreign language. It was in line with Eldridge (1996), using the native language (L1) can hinder learning the target language in classroom. In addition, Harmer (2007, p.134) also mentioned detriments in using the pupils’ L1. One of the disadvantages discussed is the fact that the usage of pupils’ L1 limits TL exposure.

5. Conclusions and implications

The current study revealed that the teachers did code-switch in their classrooms and they tended to code-switch in those situations such as grammar explanations, vocabulary explanations, giving instructions, management, improving relationship with students, cross-cultural explanations and humour. Moreover, although no one denies the benefits of using L1 in EFL classrooms, almost all teachers claimed that they
want to speak more English in the classroom. These teachers have a belief that the use of English only during the lessons can boost their students’ learning. In addition, the teachers in this study considered code-switching as an effective tool in teaching. They are generally aware of the functions of code-switching in the classroom and admit that code-switching can be catered to the students’ demand in learning language. However, it is recommended that teachers should raise concerns about the drawbacks of code-switching in their English language classrooms. Because the ways of code-switching by teachers can have an impact on how students acquire the language in their learning process, it is important for teachers evaluate their students’ level to employ code-switching in EFL classroom appropriately. Maximizing the use of English in the classroom needs to be done to boost students’ learning needs and language abilities.

References


The Frequency and Functions of Teachers' Use of Mother Tongue in EFL Classrooms

Creative Commons licensing terms
Authors will retain the copyright of their published articles agreeing that a Creative Commons Attribution 4.0 International License (CC BY 4.0) terms will be applied to their work. Under the terms of this license, no permission is required from the author(s) or publisher for members of the community to copy, distribute, transmit or adapt the article content, providing a proper, prominent and unambiguous attribution to the authors in a manner that makes clear that the materials are being reused under permission of a Creative Commons License. Views, opinions and conclusions expressed in this research article are views, opinions and conclusions of the author(s). Open Access Publishing Group and European Journal of English Language Teaching shall not be responsible or answerable for any loss, damage or liability caused in relation to/arising out of conflict of interests, copyright violations and inappropriate or inaccurate use of any kind content related or integrated on the research work. All the published works are meeting the Open Access Publishing requirements and can be freely accessed, shared, modified, distributed and used in educational, commercial and non-commercial purposes under a Creative Commons Attribution 4.0 International License (CC BY 4.0).