ORIGINAL ARTICLE

REPRESENTATION OF MENTAL PROCESSES AND THE USE OF ARTEFACTS IN STRUCTURING SPANISH LANGUAGE SENTENCES

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ABSTRACT – According to Sociocultural Theory (Vygotsky, 1978), the mental function can be enhanced through the process of mediation of language or cultural artefacts. This theory was based on the field of study that focuses on the concept of 'collaboration' with experts, peers or those who are more knowledgeable in the Proximal Development Zone (ZPD) to improve students' abilities. Most studies that involve the concept of ZPD are more focused on collaboration/effectiveness of interaction with experts or peers. The effectiveness of these collaborations is also often measured by pre-post test research designs. However, the mental activity within the ZPD that displays the use of artefacts during the writing process to result in the final text resulting from this collaboration is rarely demonstrated. Even in scenarios where students are learning a foreign language in Malaysia (especially Spanish), most of the time they were able to perform written assignments at their convenience and without the help of an expert or teacher. How students solve lexical and syntactic problems while structuring Spanish sentences without the presence of an expert during the sentence structuring process is a matter that is rarely studied. This study focuses on mental processes that display the use of artefacts that occur in ZPD during the Spanish writing process. Using the TAP (Think Aloud Protocol) method, the findings not only was able to display the ways to use the artefacts but also able to show representations of the mental process of lexical and syntactic acquiring activities. This study displays several forms of the use of language artefacts and social artefacts to solve lexical and syntactic problems encountered while structuring Spanish sentences. These findings also provide pedagogical implications in the teaching of foreign languages such as Spanish.

INTRODUCTION

Studies related to writing skills in the context of second language acquisition (SLA) or foreign language (FL) have presented a large number in research on student writing strategies (Cárdenas Marrero et al., 2009; Riazi, 1997; Sasaki, 2000; Wenden, 1991). Recently, researchers have shifted the direction to understand students' actions when they face difficulties or problems with their second or foreign language writing tasks, in their social and cultural environment. The focus of their research no longer uses the term strategy, but rather focuses on students 'actions in their social world as helpers and mediators to solve their problems or shortcomings during the writing process. Vygotsky (1978) explained that language is the main mediator in the process of cognitive development to a higher level, using the concept of the Proximal Developmental Zone (ZPD). According to Gass & Selinker (2008):

> '..*human activity (including cognitive activity) is mediated by what are known as symbolic artifacts (higher-level tools) such as language and by material artifacts.'* (p.283)

Both of these tools (language and physical tools) are expressed as artefacts (Lantolf, 2000); to aid the mental transformation of individuals through social relationships to complete their tasks (Ellis & Barkhuizen, 2005). Mediation is central to the concept of ZPD where human mental capacity from their current level can be increased to potential levels in their social world (Lantolf & Thorne, 2006, Ellis & Barkhuizen, 2005; Foster & Ohta, 2005; Khatib, 2011). The act of human beings seeking and determining mediation as a way of solving problems faced in their social world shows that human mental ability from their current level can be increased to a potential level, through the concept of ZPD.

ZPD is the distance between an individual's current level of development in problem-solving without assistance as compared to the developmental level of that individual's actual potential to solve problems with help from adults or collaboration with a knowledgeable partner. Based on the concept of ZPD in second language learning, ZPD is redefined as the distance between the current level of linguistic ability of students with their potential level of development after getting help from an expert, teacher or 'peer' (Ohta, 2001). ZPD is an important concept to understand on how current mental level function can be upgraded to potential developmental level after obtaining the help of experts or knowledgeable friends and how it will form long-term knowledge through the process of finding and determining help to

solve problems till they can act alone without help in the future. (Lantolf & Thorne, 2006). ZPD not only provides assistance or alternatives while interacting to complete a task, but also brings the novice to a level of cognitive development as high as possible through mutual interaction (Fernyhough, 2008), and as a conceptual tool needed to increase knowledge capacity (Lantolf & Thorne, 2006).

MEDIATION

According to Vygotsky (1978), human mental development is not determined by biological maturity and natural desire, but through the involvement of social activities involving mediating tools. Through the social activity, interaction takes place between the individuals involved, and it is during this time that language and social artefacts are connected to solve problems that were faced together. Individuals acquire knowledge through mediation performed and readjusted as appropriate to solve the problems encountered. The process of obtaining help through this mediation can improve mental function through transformation, which is from a low level to a higher level (Khatib, 2011). Mediation either in physical form (equipment) or language is an additional tool to promote the relationship between the mental and the social world i.e. connecting humans to the object environment or mental behaviour (Lantolf, 2000; Ellis & Barkhuizen, 2005).

The mediation of language and equipment connects men to men and also men to the world of equipment around them. Humans use language intermediaries as tools to control activities, control thoughts, plan and act rationally in solving problems or difficulties (Shahril & Tam, 2016). Language is also a communication tool that develops in a cultural context and will not be acquired naturally but is derived from the tendency to solve problems encountered, either in the learning process or during social activities. When humans communicate, they not only use symbols or signs, but they create tools that allow them to collaborate with other individuals to achieve their goals (Lantolf, 2006; Lantolf & Beckett, 2009). According to Fernyhough (2008), the sharing of knowledge and experience between individuals to understand something is actively restructured in the mental and occurs during the process of mediation.

Intermediaries also consist of physical equipment such as machines or online tools such as Google Translate that are used when faced with problems while performing a task (Shahril & Tam, 2016); and humans are associated with individuals who use social mediators in life (Moussa, 2009). Through mediation (physical and language tools/ online equipment) when performing social activities, mental functions are mobilized to assess situations, determine appropriate ways and actions to obtain the desired results. Through mediation activities, while solving problems, knowledge can be improved compared to if they only use existing mental abilities. According to Frawley & Lantolf (1985), the display of mental activity can be displayed through the use of language with other individuals such as '*next / okay'* which describes they have been satisfied acquiring the appropriate word; or '*let see'* which indicates the need for reconsideration or facing a problem.

In the context of students in Malaysia, they are exposed to the use of Bahasa Melayu (BM) and English (BI) when socializing. So, there is the use of words such as *'ok'* and *'seterusnya'* to show they have solved the problem, or words like *'macam mana', 'apa ini', 'biar betul'* or *'haaa'* when faced with a problem or when help that was expected was not enough. Although the form of the word used varies according to one's culture, it can be interpreted as a form of language use that describes mental activity when faced with a problem and strives to solve it. It is this process that makes mental function can be enhanced through the mediation of language artefacts / physical tools / online equipment to solve problems (Shahril & Tam, 2016).

WRITING IN SPANISH AS A FOREIGN LANGUAGE

The task of writing whether to submit assignments, prepare for presentations or exams is a big challenge for every student especially in the Spanish language (BS). Writing is a complex process, in which knowledge of grammar, sentence structure, vocabulary and thinking skills combine simultaneously (Ochoa, 2004: x). According to Scott (1996: 51), writing in a second (L2) or foreign language (FL) is a process that involves the proliferation of ideas, the use of long-term memory, and mastery of grammar that differs from the writer's native language. Producing writing in Spanish (BS) is also necessary to the mastery of grammar, vocabulary and structure. Most students are not aware of the presence of masculine and feminine genus elements in BS vocabulary because they are possibly absent in their respective mother tongues (Mariyati, 2008).

According to Johnson (2008: 64), the acquisition of L2 or Foreign language (FL) depends on how students solve linguistically related problems. Even strategies in language acquisition (SPB) also needs to be taken into account, where excellent students use more language acquisition strategies (SPB) than average students (Neo, 2005). Most studies in the field of language acquisition also display the actions of students using their native/first language (L1) knowledge to solve problems in L2 / FL writing. According to Beare (2002), the action of students solving linguistically related problems in L2 writing is to use their L1 abilities; while Scott (1996) explains that writers use mother tongue (L1) and second language (L2) as a way to complete the FL writing task. According to Cárdenas Marrero (2009), students who take Spanish as a Foreign Language (ELE) use their L1 as an approach in creating their writing to generate ideas, plan, draft, compile, review and reduce anxiety in the process of performing ELE writing tasks.

If we look at the scenario of students learning Spanish in Malaysia, most of the time they perform written assignments according to their convenience. Students only rely on their L1 or L2 writing experiences, in addition to the mediating artefacts in their environment to solve problems during the sentence structuring process. How do students use artefacts to solve lexical and syntactic acquiring problems while structuring Spanish sentences without the presence of an expert in situations of their limited Spanish proficiency? In addition, the how for the display of the mental process on the use of

artefacts during this structuring process is also something interesting to highlight. Using the Think Aloud Protocol method and recording data, the researchers were able to track the use of artefacts and display representations of mental processes of mediation activities in ZPD. However, this study does not measure the level of development of students' potential. Instead, this study can display the students' mental processes; in terms of the interaction of language and social artefacts as a mediator to solve lexical and syntactic problems while structuring BS sentences.

METHODOLOGY

Research Context and Design

The study was conducted on 72 students who had registered for the Elective Spanish Communication Course Level I (Basic) at the Sultan Idris Education University (UPSI). Students in the Basic level was selected because they fit the study design that helps to explain the phenomenon of mediation activity while structuring BS sentences. In situations without the presence of any experts, students' language diversity and low BS proficiency can contribute to the variety of phenomenons on the use of artefacts when structuring BS sentences. Students were given the task of writing Mi Mismo / 'myself' and was recorded using the 'Think Aloud Protocol' (TAP) recording procedure. The TAP recording was transcribed and the final text was evaluated by an appointed evaluator. TAP transcripts were analyzed using qualitative analysis methods on the unit of analysis to unravel the mental processes that display the use of artefacts while structuring BS sentences.

Data Collection Procedure and Analysis

Students are given written assignments in the laboratory according to the sequence of the writing process, namely pre-writing (25 minutes), compilation (40 minutes) and revision (25 minutes) using the TAP procedure and recorded using the 'Sound Forge' instrument version 7.0 / 8.0. TAP briefings and exercises were conducted for 120 minutes, namely training using Sound Forge instrument version 7.0 / 8.0 (60 minutes), and sentence construction training (60 minutes). The gap between each of the recording process was about a week (according to the actual lecture schedule) because continuous recording results in fatigue and loss of focus. Throughout the writing and recording process, student writing drafts were collected as supporting data; if needed; when making the transcription.

Next, the written results from this recording procedure were collected for submission to the evaluator. The results of these writings were evaluated using the Analytical Marking method (Jacob et al. 1981; quoted from Huges, 2003) by the appointed evaluators and recorded in the Achievement Profile Record form (marks, grades, number of sentences, words and lexical errors). The entire TAP recording was transcribed using transcription indicators adapted from Flower & Hayes (1980), Wang & Wen (2002) and several other appropriate transcription indicators. Transcriptions were done as 'verbatim' and divided according to the needs of the study conducted. Only then the transcripts displaying specific characteristics of mediation activities were taken as data for analysis. Emphasis is given to specific characteristics such as the use of language / social artefacts (e.g. Google translate, books, friends) when structuring sentences (Table 1).

Table 1. T Unit of Analysis dan Transcription Indicators.

Transcription Indicators	Example
'...' pause exceeding 2 seconds.	..home...study place ... what else arrr ... studying…
	…'FIERCE'(TG)***FEROZ***…
(TG) - *Google Translate* site,	*RESPONSABLE < responsable >*…
<...> - listening to *Google Translate* audio,	..brothers...(B)…*hermanos*..
(B) - make a book reference	..."DRINK"...(R) wey minum cakap apa haa..
(R) - asked a friend	...'MY FATHER'(TG) ***MI PADRE***..
'ABC' - BM source text as a Google Translate entry	
"ABC"- BI source text as a Google Translate entry	... "NOW" … (TG) ***AHORA***...
ABC - target language / BS translation results	
ABC - re-read BS while structuring	...'BERSARA' (TG) ***JUBILADO***..
{...^} - BS -BM retranslation	...*MI PADRE*..
{...^^} - BS -BI retranslation	
("abc") - BM -BI translation results	..*mi nombre* … {nama saya^}..
('abc') - BI -BM translation result	..*mi nombre* {my name^^}..
(***abc***) - the final text of the writing	..'AYAH SAYA'...("my father")..
text	.."NURSE"...('jururawat')..
teks - vocabulary/phrase errors from the evaluator	...***me gusta cocinar***..
(**teks**) - correction from evaluator	***el tengo***..
	el ***tengo*** (**tiene**)..

RELATED WORK

One sentence for each structuring process was taken as a citation for qualitative analysis. Excerpts start from the beginning of the structured sentence to the end, regardless of the length of the structuring process. Excerpts were analyzed using the Unit of Analysis (UA) procedure which is a full excerpt containing a 'pause' (pause utterance) and actions indicating the idea stopped due to physical interruption (typing, asking a friend, flipping through a book, etc.). Each of these 'pauses' is defined as a segment, and the combination of these segments represents one UA. This means that each unit of analysis consists of a combination of several segments (Table 2).

Table 2. Unit of Analysis (UA).

[.. 'SAYA BERASAL DARIPADA MELAKA' (TG)... *SOY DE MALACA*..]

Segmen	Text	UA
S1	/'SAYA DARIPADA MELAKA' (TG)/	
S2	/*SOY DE MALACA*/	1

Table 2 above is a UA excerpt showing the process of generating a sentence, where the idea was disconnected due to the act of typing Google Translate to obtain a translation of a phrase or sentence (S1) and Google Translate feedback (S2). A single segment does not necessarily contain the target language (S1) but a combination of segments can display mediation activity (S1 - Google Translate; S2 - GoogleTranslate feedback results). Based on selected UA passages, a qualitative analysis of UA containing segments can explain the mental process in terms of mediation activity during the process of structuring Spanish sentences.
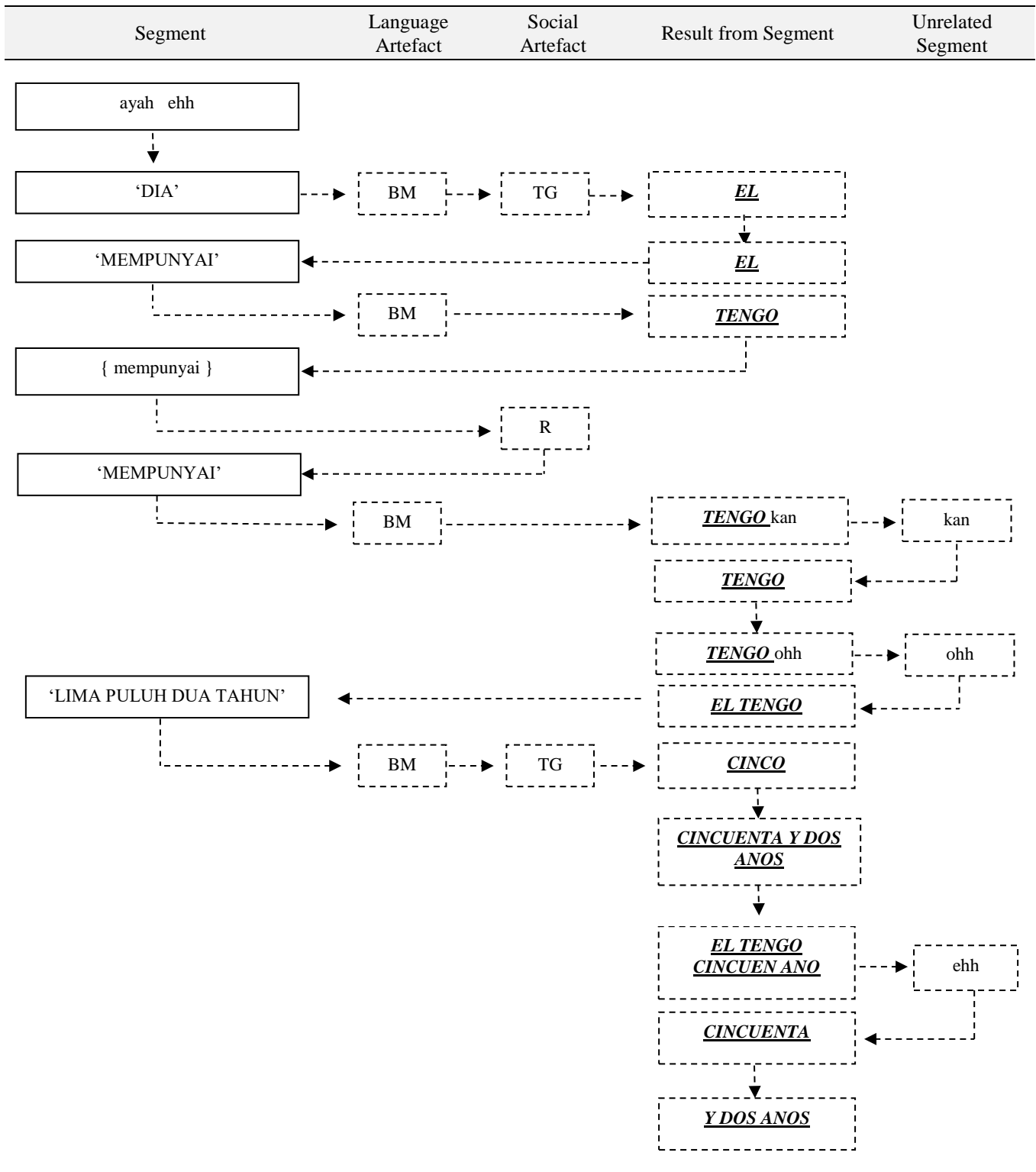
RESEARCH FINDINGS

Mediation of language artefacts and social artefacts while structuring Spanish language sentences

This study shows, without the presence of experts, students were able to use mediation between language artefacts of Malay (BM) and English (BI) and to combine language artefacts (BM and BI) during the structuring of the Spanish language. Students also used mediation with the use of the social artefact, Google Translate (TG), books (B), friends (R); and a combination of TG and book/friend, or a combination of all of them (TG, book and friend) to solve lexical and syntactic related problems when structuring BS sentences.

Figure 1. Mediation of BM (Language Artifacts) and a combination of Google Translate and Friends (Social Artifacts).

El tengo (**tiene**) *cincuenta y dos anos*.
(Dia berumur lima puluh dua tahun)

Segmen	Teks
S1	ayah ehh
S2	'DIA' (TG) *EL*
S3	*EL*
S4	'MEMPUNYAI'
S5	*TENGO*
S6	*TENGO*
S7	{mempunyai^}
S8	(R) 'MEMPUNYAI' *TENGO* kan
S9	(R) *TENGO*
S10	*TENGO* ohh
S11	*EL TENGO* 'LIMA PULUH DUA TAHUN'
S12	(TG) *CINCO*
S13	*CINCUENTA Y DOS ANOS*
S14	*EL TENGO CINCUEN*
S15	ehh *CINCUENTA*
S16	*Y DOS ANOS*

| Segment	Language Artefact	Social Artefact	Result from Segment	Unrelated Segment
ayah ehh				
'DIA'	BM	TG	***EL***	
'MEMPUNYAI'			***EL***	
	BM		***TENGO***	
{ mempunyai }				
		R		
'MEMPUNYAI'				
	BM		***TENGO*** kan	kan
			TENGO	
			TENGO ohh	ohh
'LIMA PULUH DUA TAHUN'			***EL TENGO***	
	BM	TG	***CINCO***	
			CINCUENTA Y DOS ANOS	
			EL TENGO CINCUEN ANO	ehh
			CINCUENTA	
			Y DOS ANOS	

Students use mediation artefacts Malay (BM) and the combined social artefact Google Translate (TG) and a friend (R) during the structuring sentences BS (Figure 1). Students structure in word by word form ('he'; 'have') and in phrase form ('fifty -two years'). Findings showed that, although initially, students had acquired tengo from TG feedback, at a later stage students had asked for peer help to acquire lexical tengo (have) again as a form of revision. Indirectly, this finding shows a form of cross-checking using different social artefacts, namely Google Translate (TG) and friends, although the structured sentences contain verb errors, namely tiene (he has / aged) instead of tengo (I have / aged). The findings also show a form of revision on the lexical category of verbs (tengo) and the functional word category of masculine genus articles (el - 'dia') during the sentence structuring process. This action suggests that students who emphasize the internal structure of sentences during the structuring process will tend to incorporate the mediation of combined social artefacts. The final text contains sentence errors because the student's knowledge is still at the novice level. However, these findings prove that students use the mediation of language artefacts and social artefacts to solve

lexical and syntactic related problems while structuring sentences. The findings also show that structuring a word as a Google Translate entry tends to have more lexical errors compared to structuring a phrase as a Google Translate entry.

Figure 2: Combination of Language Artefacts of BM, BI and Social Artefacts of Google Translate.

Yo vivo en Marang
(Saya tinggal di Marang)

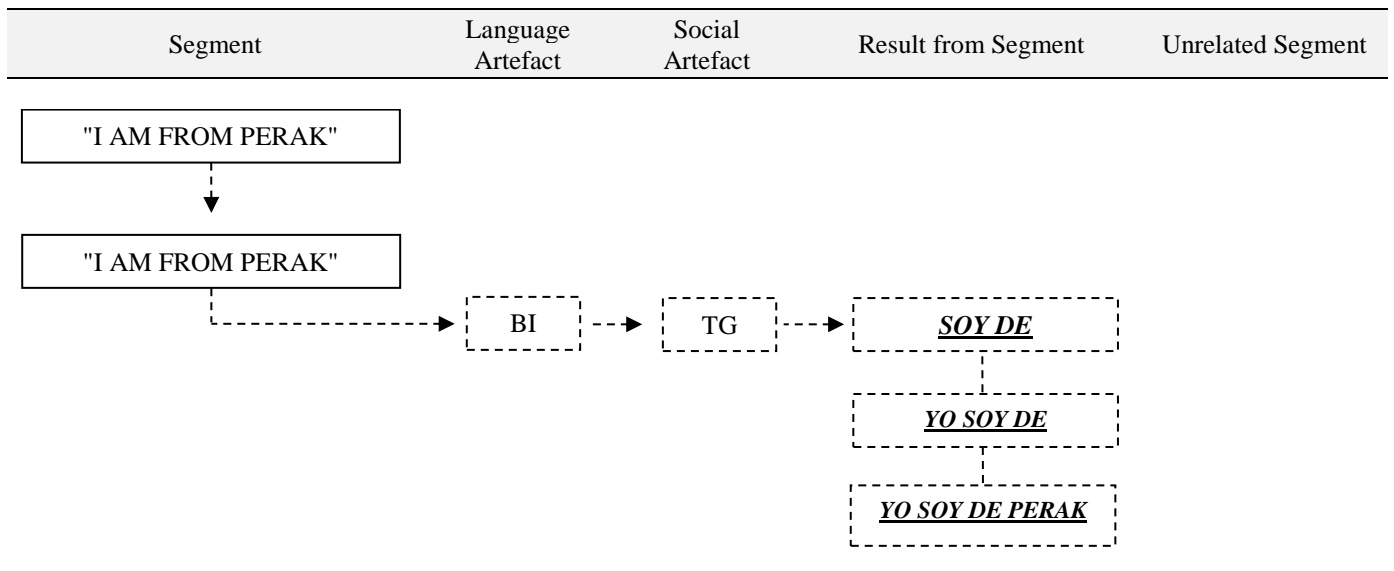| Segmen	Teks
S1	tempat tinggal
S2	'SAYA TINGGAL DI MARANG'
S3	(TG) ("i live in Marang")
S4	sekali lagi daripada BI ke Spanish nak tau
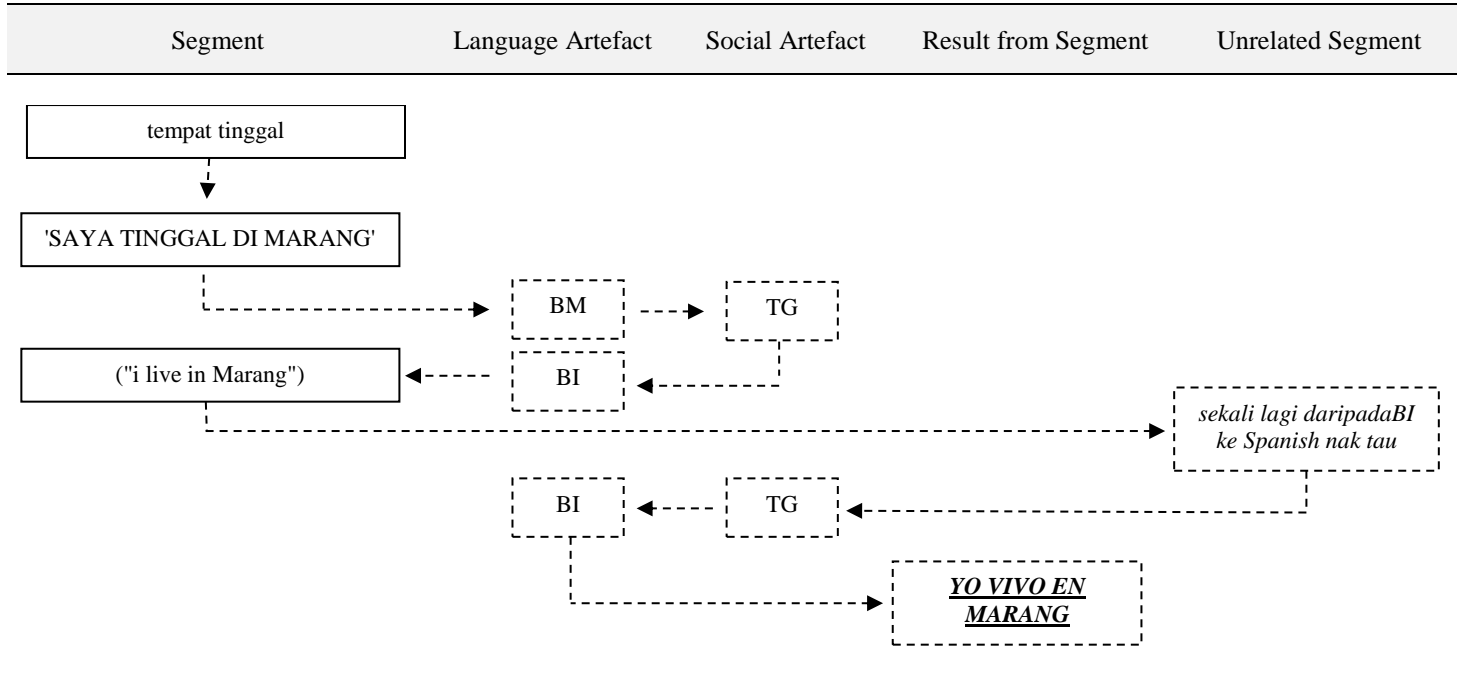
Findings show structuring activities in the form of single sentences using BM ('saya tinggal di marang') and BI ("i live in marang") artefacts interchangeably (Figure 2). The feedback displayed by Google Translate (yo vivo en Marang) can produce a final text that is free from sentence errors. At the beginning of the structuring, students used BM artefacts ('i live in marang'), and through the mediation of Google Translate, students switched to the use of BI artefacts as Google Translate entries ('i live in marang') as a method of problem-solving using different language artefacts. Based on these findings, students obtained the same sentence structure using BM and BI as Google Translate entries to obtain the final text yo vivo en Marang. The two sentences (BM and BI artefacts) used by this student explain the action of using the knowledge of BI artefacts as syntactic control to solve problems in structuring target sentences. This action describes a form of 'revision' activity while structuring sentences using knowledge of different language artefacts (BM and BI) to improve the ability to produce text that is free from sentence errors.

Figure 3. BI Artefact in the Single Sentence form and as a Google Translate Entry.

Yo soy de Perak
(I am from Perak)

Segment	Text
S1	"I AM FROM PERAK"
S2	"I AM FROM PERAK" (TG)
S3	***SOY DE***
S4	***YO SOY DE***
S5	***YO SOY DE PERAK***

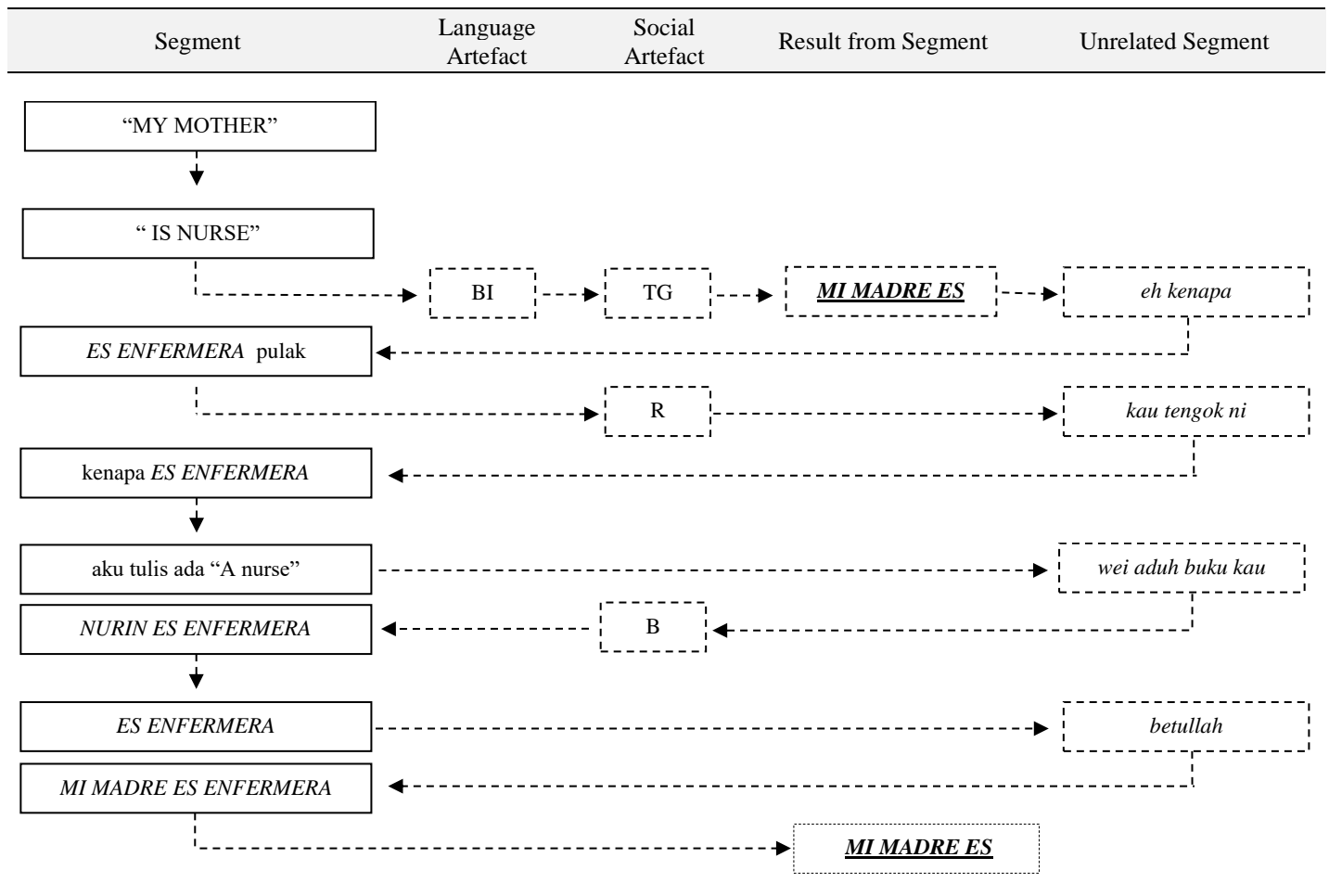| Segment	Language Artefact	Social Artefact	Result from Segment	Unrelated Segment
"I AM FROM PERAK"				
"I AM FROM PERAK"	BI → TG		*SOY DE*	
			YO SOY DE	
			YO SOY DE PERAK	

This study also displays the use of BI artefacts structured in the form of single sentences as Google Translate entries capable of producing texts that are free from sentence errors (Figure 3). Structuring a single sentence using BI artefacts ("I am from Perak") as entries gives an advantage because the capabilities of the Google Translate translation system are more stable when using BI as entries. The stability of the BI lexical and syntactic package from Google Translate allows the resulting final text displayed (*Yo soy de Perak*) are sentences that are free of lexical and syntactic errors.

Figure 4: Use of BI Language Artefact and a Combination of Social Artefacts of Google Translate, Friends and Books.

Mi madre es enfermera
(Ibu saya seorang jururawat)

Segment	Text
S1	"MY MOTHER"
S2	"IS NURSE" (TG) *MI MADRE ES*
S3	ehh kenapa *ES ENFERMERA* pulak
S4	(R) kau tengok ni kenapa *ES ENFERMERA*
S5	aku tulis ada "A nurse"
S6	wei aduhh
S7	buku kau
S8	(B)
S9	*NURIN ES ENFERMERA*
S10	*ES ENFERMERA*
S11	*betullah*
S12	*MI MADRE ES ENFERMERA*

Segment	Language Artefact	Social Artefact	Result from Segment	Unrelated Segment
"MY MOTHER"				
" IS NURSE"	BI → TG →		*MI MADRE ES*	*eh kenapa*
ES ENFERMERA pulak				
		R		*kau tengok ni*
kenapa *ES ENFERMERA*				
aku tulis ada "A nurse"				*wei aduh buku kau*
NURIN ES ENFERMERA		B		
ES ENFERMERA				*betullah*
MI MADRE ES ENFERMERA				
			MI MADRE ES	

Students also used combined social artefacts mediation to solve problems related to differences in feedback, which was obtained from different social artefacts (TG, friends and books) or the knowledge clash between language artefacts when structuring BS sentences (Figure 4). Students structure a single sentence using BI artefacts in the form of sentences as Google Translate entries ("my mother is a nurse"). At the beginning of the structuring, students obtained *mi madre es enfermera* through Google Translate. At this stage, students are faced with a clash of knowledge between BI and BS related to article 'a' which should have been stated by Google Translate in the sentence "my mother is a nurse" as *mi madre es una enfermera*. Yet, when students acquire *mi madre es enfermera* (without *una*), students try to solve the problems encountered through the help of a friend. When a friend did not provide feedback, students turned to the help of books. Students obtained an example of a phrase found in the book that is *es enfermera* (The researchers found that there was an example of the sentence *Nurin es enfermera* on page number 21 of the textbook *Tú y Yo* which was used as a BS module book for the course). Based on the example of the phrase found in the book (*Nurin es enfermera*), the students dropped the word *Nurin* and imitated the phrase *es enfermera* by replacing the previously structured sentence with the help of Google Translate ("my mother" - *mi madre)* to produce the sentence *mi madre es enfermera*.

This student action demonstrates a form of problem-solving related to differences in feedback obtained from different social artefacts (Google Translate, friends and books) while structuring BS sentences. These findings display a form of knowledge clash between language artefacts (BI and BS) on the use of articles ("a" - *una*) solved using different social artefacts (Google Translate, friends and books). This study indirectly exhibited the act of using merged social artefacts (from Google Translate to friends and books) as a form of problem-solving to produce error-free BS sentence structures. The tendency of students to use these combinations of social artefacts was also due to lexically or syntactically related feedback that was different from the social artefacts used. These findings also illustrated the actions of students using social artefacts based on the way the sentences were structured, i.e. whether students emphasized internal or external structural forms. If the emphasis was only on external structures such as lexical relevance, only Google Translate social artefact mediation was used and the students were not inclined to make other artefact mediations. However, if the emphasis was given to internal structures such as the use of the lexical "a" - *una* (Figure 4), a combination of social artefacts (Google Translate - friend - book) were seen during sentence structuring.

CONCLUSION

This study shows that in a context without the presence of experts, Google Translate has replaced the task of experts to solve lexical or syntactic problems because it is faster and easier. The use of BI artefacts as TG entries also showed more stable results due to the more robust TG translation system and also due to some linguistic similarities between BI

and BS, especially on the use of articles and singular or plural nouns/numbering. Without the presence of experts, the study did not display enhanced mental function, but students were able to produce a final text that was free of sentence errors, depending on the form of linguistic and social artefact mediations used. Although artefacts were used, the final text also relied on the students' BS proficiency to identify grammatical and syntactic differences of BM, BI and BS during sentence structuring. According to Lantolf & Thorne (2006), differences in the impact of mediation for the use of artefacts are related to the differences in language proficiency among students. Ellis & Barkhuizen (2005) explained that despite obtaining the same expert help, ZPD between students will be different if the level of potential development is not similar. Thus, when Google Translate replaces the expert, the student's ability to produce an error-free final text is largely affected by the student's Proximal Development Zone (ZPD) and the limitations of Google Translate. Although this study mentioned the use of book and peer-aids were also used to solve problems while structuring sentences, the findings showed students' showed most dependence on TG to acquire lexical and syntactic while structuring BS sentences. The structuring process revealed a form of cross-checking using language artefacts (BM-BI; BI-BM) or social artefacts (Google Translate and friends/books).

As TG replaces the need for language experts, language-artefact based learning and teaching (PdP) and TG need to be emphasised. Emphasize the differences in the feedback about language artefact as TG entries. It can be done through sentence construction exercises by monitoring the verb conjugation as well as gender adjustment on the articles and countable nouns/numbering (singular or plural) of TG. If using BM artefacts, do monitoring and evaluation of gender and articles on nouns. For the use of both BM and BI artefacts, do a cross-check on verb conjugation and adjustment of the article, gender and nouns/numbering while ensuring to avoid TG translation results from BM and BI phrases during structuring.

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