
Simulating the Learning Method of Learners of English as a Second Language

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Abstract

Using the Language Change Model of Wilensky, this study predicted the most effective method in teaching English to second language learners (SLL). Using the parameters as set by the model, this study identified three teaching methods in teaching English to SLL: one-on-one interaction using the English language; group interaction using the English language; and the mixed method (the use of both one-on-one and group interactions, and learners encouraged to use the target language and their native tongue in the interactions). The generated data from the model were statistically treated using regression analysis. The results showed that one-on-one interaction using the English language and group interaction using the English language were the methods ESL learners could better learn the target language rather than through the mixed method. The results implied that a person can learn English without the facility of his/her first language, and that there are methods that are effective in the teaching of English. With the smorgasbord of strategies and methods in English language learning, there are methods that may cater to different kinds of learning. With the proper execution of the method, i.e., group interaction using English, learners can acquire a second language even without the facility of their first language.

Key words: NetLogo, teaching method, English as a second language, language change, one-on-one method

Introduction

How to teach the English language in such a way that learners can articulate themselves in the target language has always been the concern of English teachers. This pedagogical importance has paved the creation and innovation of teaching and learning methods. It started with the classic method or the grammar translation method where the goal of learning a language was studying its grammatical aspects and using this grammatical competence to translate a text to a target language. It eventually led to an eclectic approach where a teacher's

teaching repertoire came from a range of different techniques and methods. With those ideas in mind, this present study determined an effective method for learners of English as a second language to learn the most.

English classes are often replete with activities that are designed to help students learn the target language. Teachers make use of activities that require individual instruction, grouping, or a mixture of both of these strategies. However, for individual instruction, Kaye (2008) describes how one-on-one classes

are different. He points that a teacher can adapt existing materials and strategies to suit this kind of classroom instruction. Also, the learner often decides a flexible learning pace. There is a shift from teacher-centered instruction to learning where the student contributes to the decision-making in the class. However, the learner may feel less pressured because there is no one in the class but him or her.

On the other hand, the grouping of students for instruction and interaction is often termed as cooperative learning. Johnson, Johnson, and Smith (2013) define cooperative learning as a strategy utilized by a teacher in the classroom where students are grouped heterogeneously to accomplish various learning tasks. Teachers utilize this method with the basic premise that students can contribute to each other's learning. This method also stresses the importance of interaction in second language acquisition (SLA). Long (1981) posits in the Interaction Hypothesis that SLA can be facilitated by interaction as conversation where linguistic inputs are provided through communication among learners. Hatch's (1978) notion on the importance of the development of grammar through conversation and Krashen's (1985) Input Hypothesis that stresses the importance of comprehensible input in language acquisition are the two major linguistic suppositions that Long based his hypothesis on. These notions stress the significance of interaction in acquiring a target language.

Grouping allows for interaction through which students accomplish learning tasks together in the target language. In most language learning classrooms, teachers shift from one approach to the next with certain bases. This approach is termed as principled eclecticism, which uses a variety of language learning activities, based on the learner and academic conditions (Larsen-Freeman, 2000). This shift is often influenced by learners' needs and curricular requirements.

Also in the present study, the methods

described were one-on-one interaction using the English language only; group interaction using the English language only; and, the mixed method using either individual or group interaction and the use of the target language, English, and the learners' mother tongue. Literature suggests that the behaviorists' learning theory posits that there are more negative influence of the first language (L1) to learning a second language (L2). Corder (1981:1) quoted by Yu (2016) explains that errors in the L2 are the 'the results of the persistence of existing mother tongue habits in the new language.' This implies that when the mother tongue is used while learning a second language in the classroom, the L1 may be detrimental as old language habits persist. This further implies that learners can learn another language without resorting to their L1; such is the case in a school in Hawaii where language use among students is regulated in favor of English.

Berger (2011) found out that Japanese students preferred their teachers and themselves to use English often. However, the researcher was dubious on the effectiveness of the use of English only in the instruction. Also, there were a lot of criticisms against the use of English only in the instruction such as loss of home language skills (Anderson, 2015), discrimination, and devaluing of the minority culture (Zimmerman, 2010). Because of some setbacks the English-only has in a classroom, there are educators who use the learner's L1 in the English class. Ross (2000) states that if students know the differences between their native language and the target language like in lexis and syntax, their L1 will not interfere with the learning and use of the target language. The differences even show that the L1 facilitates the learning of another language.

These studies imply the value of the English language as the lingua franca of the world as it is used in commerce and information. English is the most learned second language in the world based on a study conducted in

Italy (Gasperetti, 2014). However, a learner of the English language may be confronted with some peculiarities in learning it. For one, the tense or time of the verb that they would like to convey in English may pose some problems. Aside from the simple tenses, it is also inclusive of the perfect, progressive, and in combination. If the language of the learner does not provide notions on these tenses, this may result in some confusions. Aside from this, English has the largest vocabulary due to the incursion of other languages into its linguistic sphere. Adding to that, how the words are pronounced may also be a challenge. With its 20 vowels and about 24 consonant sounds, how a word is uttered may sound different from its spelling. For a Filipino learner whose language is syllabic and has only five vowel sounds, this may pose difficulties. These are just a few of the challenges a second language learner of English may encounter.

The influx of learners from other countries to the Philippines and the challenges that a language teacher faces necessitate the identification of which methods would be most facilitative in learning English. Also, with mother-tongue based learning as a new curricular change in the Philippines, it is salient to point out the role of both English and the native language in learning English. Thus, the present study tried to address these gaps with the results of the investigation.

The present study made use of Wilensky's model of Language Change. This model allows for the simulation of how two languages are used by individuals in social networks and how this use influences others in using the language in their interactions. The model is translated to language learning as the parameters were set to simulate the methods used by a teacher either using English alone or both English, and the learners' L1 and how a learner influences others to do the same.

The current educational system in the Philippines has implemented the Mother-Tongue-Based Multilingual Education (DO 16,

s. 2012). This is also supported by the United Nations in their Education for All Program. Mother-Tongue-Based Multilingual Education (MTB-MLE) curriculum refers to the use of the child's first language in learning all his subjects in the first three grade levels. Because of this present state in the educational landscape, the researchers deemed it important to incorporate the use of the mother tongue in interactions as one of the three methods in the present study. The other two methods were chosen based on how the English language is commonly taught: individualized instruction and cooperative language learning. These three methods parallel with the parameters of Wilensky's model.

Objectives of the Study

The question as to the method utilized by the teacher through which a learner learns optimally was the basic premise of this research. Specifically, the study would like to know which among the three methods of teaching English to second language learners was most effective through the use of Wilensky's Language Change Model. The three methods were One-on-One using English language, Group interaction using the English language, and Mixed method using English language and the learner's mother tongue.

Conceptual Framework

This study used the Language Change model of Wilensky (2007). This model predicts how language behaviors of social networking users and the structure of their created nodes affect the course of language change. This model makes use of two languages in competition within the social network: grammar 0 and grammar 1. Users of the network interact with each other using grammar 0 and 1. The individuals use either of the grammar depending on the kind of grammar the other social networking users are using. This model, however, was utilized to simulate the probable method that would likely be effective in teaching English. The table below shows the

original compositions of the model and how it is translated in the present study. The parameters were thus set.

Table 1. *Language Change Model and the New Language Learning Model*

Original Language Change Model	Simulating the Effective Teaching Method Model
Num-nodes: Number of individuals	This model sets the number of individual at 100 students or learners.
Percent-Grammar 1: Proportion of the language learners who will be initialized to use grammar 1	25% of the learners are considered low users of English language; 75% are considered high users of the English language. Low users and high users mean the percentage of the English language the learners are using.
Algorithm: Individual: User randomly chooses one neighbor and adopts that neighbor's grammar. Neighbor's grammar in Wilensky's model means the other social networking users' language.	Teaching Method: One-on-One Interaction Using the English Language. In this method, a teacher teaches a learner individually using the target language, English. The learner accomplishes activities designed to be accomplished individually as facilitated by the teacher. In this study, neighbor's grammar means the language that the learners will use as required by the teacher.
Threshold: Users adopt G1 if some proportion of their neighbors is already using G1. This proportion is set with the THRESHOLD-VAL slider. For example, if THRESHOLD-VAL is 0.30, then an individual will adopt grammar 1 if at least 30% of his neighbors have grammar 1.	Group Interaction Using the English Language. In this method, a teacher forms learning groups through which she interacts with them using the English language and provides activities to be accomplished by the group. It is also assumed that if 30% of the learners in the group use the target language, it is likely that the rest of the group will do the same.
Reward: Language users update their probability of using one grammar or the other. In this algorithm, if an individual hears an utterance from grammar 1, the individual's weight of grammar 1 is increased, and they will be more likely to use that grammar in the next iteration. Similarly, hearing an utterance from grammar 0 increases the likelihood of using grammar 0 in the next iteration.	Mix Method. In this method, the teacher uses both one-on-one and group interactions. Learners are encouraged to use the target language and their native tongue in the interactions when needed.
Sink state 1: This applies for Individual and Threshold only. If on, once the individual adopts G1, he can never go back to G0.	In this model, the sink state 1 is turned on to mean that only the target language is used in the interaction in the one-on-one and the group methods.
Logistic?: This applies for reward. The probability of using one or the grammars is pushed to the extremes if on.	Learners can use both English and the native tongue, that is, Bisaya. In this model, the logistic is turned on to favor English.
Alpha: This applies for reward when the logistic? is on. The larger the value of the alpha, the higher the bias for G1.	In this model, the alpha is set at .040 (high value) to mean that the learners are encouraged to use the target language.

Based on the model, the following assumptions were formulated:

First, the more learners use English in their interactions, the more is the probability of influencing others to use the same language. Several factors affect the learning of a language.

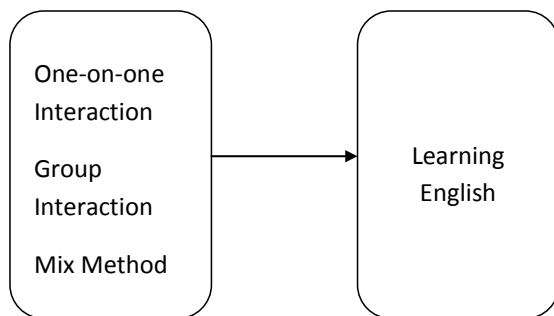
The study of second language acquisition would tell that society has an impact on one's language learning. Johnston (2010) mentions that one of the determining factors that influence the development of language learning is the social factor. The verbal environment of a learner influences his learning of that language used by the people surrounding him. Moreover, Vygotsky's social development theory states that the progress of one's zone of proximal development depends on the extensive social interaction (Vygotsky, 1962). This explains why many children who are exposed to an environment where a language is used extensively are more able to clearly communicate verbally compared to children who are not exposed (McLeod, 2014).

Second, there is an effective method in learning English. Between group and individual classroom activities, peer collaboration helps a learner achieve more language skills than when one works alone. This is according to the social development theory of Vygotsky (McLeod, 2014) stating that the social interaction is fundamental to the development of the individual and this includes one's language skills. Aside from the type of interaction and activities, the role of the first language in learning another language is also important in identifying the method that is more effective for language learning.

Third, not all methods have the same effect to learners of the English language. Johnston (2010) posits that learning a language varies across cultures. Johnston is supported by Hofstede as mentioned by Joy and Kolb (2016). Accordingly, the differences in cultural socialization tend to influence learning preferences. Some children, for example, learn to speak at a young age. Johnston cites that this is due to the interplay of the different domains such as social, perceptual, cognitive processing, conceptual and linguistic domains. Hence, language learning factors influence the acquisition of language.

The three methods were also based on the two language learning approaches. On one hand, the One-on-One and Group Interaction methods are based on the direct method. The direct method or natural approach of Gouin as mentioned in Richards and Rodgers (2014) emphasizes the exclusive use of the target language in classroom instruction. The mixed method on the other hand is based on the community language learning method. In this method, the use of the native language is permitted and the affective factors in learning are considered (Dela & Megawati, 2011).

The figure below illustrates the methods learners use in learning the English language.



Through the Wilensky’s Language Change Model, this study predicted the most useful method in the teaching of the English language. This study pre-identified the methods as shown in the figure.

Methodology

This study utilized Wilensky’s model on Language Change using the NetLogo software. The model is an agent-based or computer program simulation, imitating the details of a reality. The first thing that was done was the setting of the parameters of the model. The num-nodes refer to the population set at 100 to mean 100 learners for the three methods.

For the One-on-One Method, the algorithm was placed at individual to generate the data. Percent-grammar 1 was set to 25% to mean that the learners can only speak the language at a low

level. Sink state 1 was turned on so that learners used the target language alone. The Logistic was turned off, and the alpha slider was placed to 0 since these applied to the third method only. The number of ticks or number of interactions was set at 200. The percent-grammar 1 was set to 75% to create the data for the high use of the English language for the first method. Then, the set up was run ten times.

For the data of the second learning method, Group Interaction Using English, the algorithm was set at the threshold. The same process was used for this interaction. The set up was also run ten times.

In the third learning method, Mixed Method, the algorithm was set at the reward. The sink state 1 was turned off since this only applied for the first two algorithms. The logistic was turned on and the alpha was set to .040. The number of ticks was also set at 200. Likewise to generate the data for the low and high use of the English language, percent-grammar 1 was set at 25% and 75%, respectively. The set up was run ten times each for the low and the high use of the English language. After generating the data for each method, the data were tabulated and statistically treated using regression analysis.

Results and Discussions

Using the Language Change Model of Wilensky, this study investigated the method through which ESL learners were most likely to learn English. Below is a screenshot of the model in producing the data.

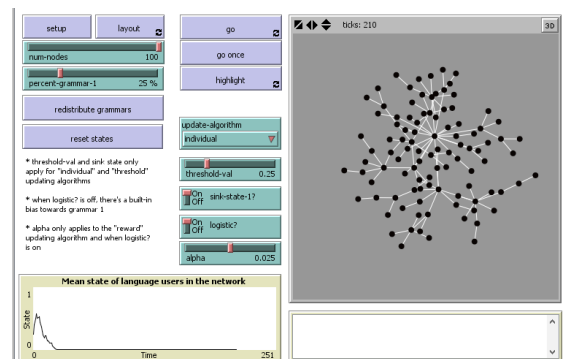


Figure 2. A screenshot of the Language Change

Model with Individual Method set at a low level for both percent-grammar 1 and threshold value with 210 ticks.

The figure above shows that when the model through NetLogo is set at certain parameters of the study, it provides simulated data reflective of a real-life scenario. The line plot shows the percentage of the use of the English language in each instance of classroom interaction. Through a series of data generation, the following information is provided.

Table 2. Interaction of Factor A and Factor B and C

Factor B (English Language Users)	Factor A (Method)					
	One-on-One		Group		Mix	
	Low	High	Low	High	Low	High
Low at 25%	0.99	1.00	0.79	0.36	0.15	0.56
	0.99	0.00	0.88	0.35	0.31	0.49
	0.00	1.00	0.78	0.35	0.27	0.45
	0.00	0.00	0.75	0.35	0.31	0.52
	0.00	0.00	0.92	0.35	0.29	0.66
	0.00	1.00	0.75	0.32	0.14	0.65
	0.00	1.00	0.91	0.44	0.24	0.60
	0.99	1.00	1.00	0.29	0.21	0.52
	0.07	1.00	0.73	0.38	0.22	0.53
	0.00	0.00	0.76	0.35	0.21	0.69
High at 75%	1.00	1.00	1.00	0.94	0.95	0.95
	0.00	0.00	1.00	0.93	0.95	0.95
	0.00	1.00	1.00	0.95	0.95	0.95
	0.00	1.00	1.00	0.88	0.95	0.95
	1.00	1.00	1.00	0.88	0.95	0.95
	1.00	1.00	1.00	0.95	0.95	0.96
	1.00	1.00	1.00	0.92	0.96	0.96
	1.00	1.00	1.00	0.95	0.95	0.96
	0.00	0.00	1.00	0.91	0.95	0.98
	1.00	0.00	0.00	0.88	0.94	0.95

The table presents the interaction of the three factors which provided the needed information for the simulation. Factor A shows the three methods of learning the English language which are: One-on-One, Group, and Mix. Factor B is the information that tells the percentage of English the individuals used in the teaching-learning process. Factor C is the information that tells when the threshold val and the alphavalue were set to either low or high. The data were generated through ten iterations based on the set parameters. These data were then treated using the General Linear Model. Table 3 presents the results of the statistical results.

Table 3. Teaching Methods and Other Variables through which Learners are Most Likely to Learn English

Term	Coef	SECoef	T-Value	P-Value	Decision
Constant	0.3469		0.0748	4.64	0.000
Variables					
Teaching Method					
One-on-One	0.0				Not Significant
Group	0.1990		0.0748	2.66	0.009
Mixed	0.1262		0.0748	1.69	0.094
The Level of English in the Methods					
High	0.0517		0.0864	0.60	0.551
English Users					
High	0.3617		0.0864	4.19	0.000
Teaching Method & English Users					
High	-0.010		0.122	-0.08	0.933

*significant at 0.05 level

It is interesting to note that Group Interaction using the English language is a method where a learner is more likely to acquire the target language. Another notable finding is that a high number of users of English in the classroom is a significant factor in learning the language. This means that a large group of learners speaking English influences others to do the same. Using Wilensky's Language Change Model via the NetLogo, the data were generated using the threshold algorithm. It is assumed in this algorithm that a portion of users of a social network influences other users in the language that they utilize in their interactions. This algorithm as translated to the present study illustrated that the teacher formed learning groups through which she provided learning activities with the purpose of acquiring the English language. Each group was expected to accomplish the tasks and encouraged to speak the target language only. Since the threshold value found on the NetLogo interface was set at .30, that is, 30% of the learners in the group used the target language. It was then expected that the rest would do the same.

The result shows that this method is significant in learning English as a second language. This proves that the first assumption is true: there is more probability of influencing others to use the same language. In language learning, if more learners use the target language, it is correlated to that of other learners who are influenced to speak the language. In

the method identified in the analysis, learners work with other learners using the English language. Based on research evidences, Fortune (2012) describes learners who are immersed in English eventually develop native-like levels in receptive comprehension in the target language and demonstrate fluency and confidence in its use. This means that English immersion provides exposure to the language in the classroom resulting to favorable language outcomes. Usually, instruction using English only is done in groups for opportunities of linguistic exchanges and practice.

Learning communities as termed by Wenger-Trayner and Wenger-Trayner (2015) engage in joint activities and discussion, assist each other, and exchange information. Collaboratively working with others helps in the development of language since they have peers whom they can practice with. This result verifies Johnston's (2010) premise that social interaction is a factor in language learning. The diversity of the performers in a group allows them to learn from each other especially when the teacher sets the roles and expected outcomes before the activities.

Also, there is less anxiety in working in groups. Von Worde (2003), examining students' perspectives on anxiety on learning a foreign language, found that a sense of community helps reduce anxiety in learning the language. This low affective filter encourages learners to get involved. Aside from this, the use of the target language in a group immerses learners in the language. Yang (2005) reveals that after eight weeks of cooperative learning implementation, Taiwanese college students' English oral proficiency level increased. This strategy allows these students to have opportunities to speak and explain their ideas in the target language. The study recognizes that learners in groups who were encouraged to speak English have improved communication skills in the language.

Though each learner may have different learning levels, their inputs to the group contribute to each other's exposure to the

language. Working with others relates to Vygotsky's (1962) social development theory underscoring the concept that learning is a social activity. Learners construct their knowledge of the language from each other thus maximizing learning. The combination of putting people in learning groups with well-defined language tasks and communicating in the target language, that is, learning in English proves to be an effective method.

Though the literature review shows advantages of collaborative learning, there are also disadvantages that result from this teaching method. Poole (2008) found that when students work together in a mixed ability group, there was a chance of intragroup stigmatization. The high ability students feel that their performance is being slowed down by low ability students, and the tendency of these students to dominate decreases the low ability students' participation. Poole also identifies that working in groups with mixed abilities negatively influences students' motivation and self-esteem. Another finding supported by other studies (Saleh & De Jong, 2005; Lou, Abrami, Spence, Poulsen, Chambers, & d'Apollonia, 1996 as cited in Heltemes, 2009) is that working in a group does not positively impact the average ability students' achievement level. Cooperative learning fails to influence the average performing students.

Beebe and Masterson (2003) also identify disadvantages of group work: reliance of some individuals on others to accomplish a task; longer time to accomplish tasks; discussion may be monopolized by an individual; and acquiescing to unsound decision to conform to majority. These disadvantages may affect students' performance in a class. Thus, a teacher facilitates group learning environments to mitigate these disadvantages. Further review, however, presents that the advantages outweigh the disadvantages as more advantages are enumerated compared to the disadvantages.

On the other hand, the second and third assumptions: there is a way in learning English

that is effective in teaching the language, and not all methods have the same effect to the learners of the English language, are accepted. The results show that there is a method whereby ESL learners can acquire language. Indeed, not all methods are successful in teaching a language. The one-on-one interaction using the English language only and the mix method using both individual and group interactions encouraging both English and Bisaya do not significantly influence the English language learning.

The probability as to why one-on-one interaction, or in other pedagogical terms, individualized instruction, yields a not significant result may be attributed to some setbacks. Kaye (2008) enumerates some disadvantages of this method. It can be physically and mentally taxing to both the learner and teacher; the learner has to do the language tasks on his own without collaborating with others. Because of this, the learner may not have enough “silent” time to process the new language inputs which is an essential cognitive activity in language learning. In a class with other students, the teacher gives time for everybody to mull over learning units. Usually, the time is lengthier to accommodate varied learner’s levels. Since there is only one learner, he may have limited time to process unless he is given longer time. Also, the teacher has to employ varied approaches for one learner. The class may become monotonous with the usual approaches used. The most important disadvantage that may be contributory as to why it is not significant a method for language learning is that there is the absence of opportunities for interaction with other learners. The previous discussion highlights the value of group interaction.

The mixed method, that is, the teacher resorts to one-on-one and group interaction using both English and the learners’ mother tongue, is also not significant. This means that this does not affect learners’ performance in English language learning. The underlying reason may be the inclusion of the mother

tongue in the interaction. The teacher allows the use of the first language (L1) of the learner. However, Harbord (1992) cites that there is the propensity to depend on the mother tongue by both teachers and students. This implies that they will develop the habit of resorting to the L1 whenever a linguistic difficulty arises. One noteworthy result in the analysis is that, the more users of English there are in the classroom, the more learners are influenced to do the same. So, in this case, the English users’ number may lessen and adversely affect other learners’ use of English as well. This does not mean, however, that the L1 is devalued, but to optimize comprehensible input of the target language, it is encouraged that classroom exchanges are conducted in English (Krashen, 1982). The mother tongue, therefore, is used minimally and with careful consideration.

These implications, nevertheless, are contested by research findings on the role of mother tongue in a foreign language classroom. Kavaliauskienė (2009) found out that Lithuanian college students’ use of their mother tongue in learning English for Specific Purposes raised awareness on the differences between English and their language and facilitated their linguistic development in the target language. On a similar strand, Timor (2012) concluded that Hebrew as a mother tongue in an English as Foreign Language class in elementary and secondary schools clarified grammatical issues and aided reading comprehension. With the findings, the researcher proposed a model advocating the use of the mother tongue (MT) with varying degrees in the teaching of the target language. Akin to these views, Butzkamm (2003) formulated a theory restoring the rightful place of mother tongue in foreign language learning. There have been other studies with similar pedagogical valuations of the MT (Hitotuzi, 2002; Ghorbani, 2013). Contrary to these studies and views, the present study’s result is inclined to the absence of the use of the mother tongue in the ESL classroom.

As this study presents, the group interaction using English and with high number of

learners using the language are factors relevant to the acquisition of this second language. This study used simulated data reflective of real-life language classroom. It would also be pedagogically beneficial to identify other factors that contribute to English language learning as these would also guide teachers in structuring the language classrooms in terms of the strategies to be employed. It should be noted that the data were the result of a simulation via Wilensky's Model of Language Change using Netlogo. The parameters of the model were contextualized to language learning thus imitating a real-life process.

However, it is equally important to identify the model's distinct limitation: it cannot capture the dynamics of a teaching-learning process that takes place in a language learning classroom and the human cognition. Though language learners may share characteristics, they are also distinct from each other. These differences may create learning phenomena that are exclusive from the model. The simulation results do have implications in language teaching and learning, but these should not be treated as the end-all basis for the decisions of language teaching since learners have their own unique language learning needs.

Conclusion and Recommendation

Based on the findings provided by the Language Change Model of Wilensky, the following conclusion is drawn. Collaborative learning using English only as the target language may prove to be an effective method that allows language learners to learn English. The simulation result through the agent-based model is considered as it mimics a language classroom. It is a prediction of a reality; this could be helpful in the teaching-learning decision making in a language classroom. However, a re-run of the iterations of data revealed a slight difference between the first and second data generation requiring forms of validations such as the use of actual data to verify the simulated outcomes.

Though this study provided the researchers the awareness of the learning methods whereby the English language learners may acquire the target language, the cited limitations necessitates a verification of the result. It is recommended as a future research that experimental groups with the use of the three methods be conducted. The results of this future study may prove or belie this agent-based model research findings.

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