The influence of English phonemic awareness to reading comprehension: A study on Indonesian EFL learners

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Phonemic Awareness has been reported to be one of the predictors to reading comprehension in English as a first language. Various studies have reported the effects of English phonemic awareness to reading comprehension in English as a second or foreign language, but less similar research has been reported involving Indonesian EFL learners. Indonesia and English share different phonemes that affect learners' comprehension on English. This study aims to investigate the correlation between EFL learners' phonemic awareness and reading comprehension. The subjects selected were 100 students from the 3rd semester majoring in English Language Education Program, in one of Indonesian university. There are two test obtained during this research, the first is phonemic identification test in order to measure the level of phonemic awareness, and the second is reading comprehension test to measure students' reading comprehension skill. Simple linear regression was applied to validate the influence of English Phonemic Awareness to English Reading Comprehension. The result revealed that the correlation coefficient (r) value between the two variables shows .352 degrees with the significance level .000, while the coefficient of determination (r2) shows .124 degrees. Furthermore, the regression equation formula from simple linear regression shows Y = 60.267 + 0.211 X, which reveals that if phonemic awareness value increased by 1 point, the value in reading comprehension will also be increased by 0.211. As the result, it can be interpreted that the better students' phonemic awareness, it also leads to the better reading comprehension score.

INTRODUCTION

Having phonological awareness becomes one of the fundamental skills in learning a language, especially in the process of developing reading skill (Bishara & Weiss, 2017). It supports learners to break down language into smaller components. Specifically, it is defined as the ability that allows language learners to recognize and manipulate wide range of sounds. Phonological awareness includes three domain skills, which are the ability to decode words into syllables, rhyme awareness and phonemic awareness (Sterne & Goswami, 2000). Through those three skills, learners with good level of phonological awareness will be able to detect the segmentations of words based on how it sounds in speech language that supports language learners' ability to do word spelling in the beginning of reading acquisition.

Phonemic awareness, as a part that falls under phonological awareness scope, takes more specific role as it deals with the learners' knowledge of the smallest unit in spoken language. English phoneme, as an example, is considered to have approximately 35 to 44 phonemes depends on various criteria (Bizzocchi, 2017) and each of them represents different sounds. Phonemes, to distinguish from alphabetic forms; which is a set of letter that is used in written language, is defined as the abstract forms of speech sounds which comprises single or combination of phones (Ehri et al., 2001). Ehri et al. (2001) continue to explain that the combinations of phonemes are further helps to form syllables and words. By this statement, it means that most of the words are formed up from some blended phonemes, but it does not mean that every single word existed are come up with two or more phonemes. For instance, the single phoneme word such as the pronoun 'I' and the article 'a' in English words represents only one phoneme, which is /aɪ/ for the word 'I' and /ə/ for the word 'a'.

Phonemes also indicated as a necessary part in language as it helps to create meaningful difference in words (Duncan, 2018). In particular, phonemic awareness allows learners to recognize that the words in 'pet' and 'pat' are having different meanings despite the similar sound. Both of the words start with the same initial and final phoneme /p/ and /t/. However, the replacement of the medial sounds from /e/ to /a/ creates distinct meanings, in which pet can be categorized as a noun, while pat can be meant as a verb. In additional, Rokhman et al. (2020) also explained that the learners' ability to understand word and its phoneme in isolation supports them to segment and manipulate phonemes in words, as well as helping them to form up words based on the existing phonemes. Therefore, in this situation, learners' knowledge on identifying phonemes in isolation is needed as a fundamental to enhance their process in understanding words, which also beneficial in the future reading acquisition process.

A study conducted by Alhumsi (2020) also has suggested that there is a significant connection of the first sound and first letter recognition toward word recognition that helps EFL learners in the reading process. He explains that the majority of the students began to recognize words by realizing the first sound in a word. For example, individual's process in recognizing the word 'book' began by dividing that word into its sounds, then they continued to realize that the first sound of 'book' is /b/. In another case, some pointed out that they begin the process of recognizing the word by knowing the first sound or first letter instantly. Therefore, it can be said that the role of first sound or letter in a word is as a prediction in word recognition process, which further resulting in learners' better reading acquisition.

Learners' successful reading process found to occur through their development of phonemic awareness skill which followed by their ability to recognize words as well as word processing ability (Alhumsi, 2020). Rokhman et al. (2020) also pointed out that decoding and encoding skills are projected in this process. It begins with learners' ability

to identify phonemes into its smallest units that result in better phoneme segmenting ability. The segmentation process allows learners to decode words into each of its sounds, and phoneme blending ability will follow afterwards. In the process of phoneme blending, the process of forming a new word from segmented phonemes also occur, or known as encoding process. In other words, after the learners able to segment words into its phonemes, they later will be able to do phoneme blending which helps to create a new word with different meanings.

Cárnio et al. (2017) suggested that as individual's phonemic awareness developed, their syllabic awareness can be predicted to elevate significantly. As they begin to understand the words in isolation, the level of their understanding will step up from word level of reading acquisition toward sentence and then text level. Thus, this word to text reading process will assist individual's reading comprehension skill.

Hirsh-Pasek et al. (1996) as cited in Ravenska & Hidajat (2011) also explained that word learning process occurs in young learners begins by segmenting sounds they hear, which continues to process into words, phrases and clauses. Through that process of understanding the language, children begin to link the spoken language into its meaning that also supported by paying attention to its context. Consequently, when children are able to get its meaning, their literacy skill will subconsciously also be developed.

Additionally, the researchers have found some previous findings related to phonemic awareness and reading skill. The first study was conducted by Edwards & Taub (2016), which focusing on the young learners, particularly elementary African American students, to find the specific component in phonemic awareness skills that influence learners' reading comprehension. The researchers have chosen phonemic blending and segmentation skill to be investigated to find its relationship with reading comprehension. The result reveals that learners' ability in sound blending indicated to predict more in reading comprehension than phonemic segmenting skills.

The second study was conducted by Rokhman et al. (2020), which focuses on the finding of the correlation between phonemic awareness toward word processing on EFL students in a certain higher education level in Indonesia. This study used English phoneme identification skill including onset or initial, medial and final sound that also correlated with the blending and segmenting skill to measure the participants' word processing ability. The result shows that EFL learners' ability to recognize blending and segmenting phonemes is significantly influenced by their phonemic identification ability. It means that the better students are in identifying phonemes, the better they are in blending and segmenting phonemes. Hence, this research reported that EFL students' ability to identify phonemes correlates to the word processing skills.

From the previous studies mentioned above, it shows that only specified components in phonemic awareness, which are blending and segmentation, had investigated to link with learners' reading comprehension. Furthermore, it also

reveals that the first study is more focused on earlier ages of African-American Vernacular English speakers, while the second study is focused on EFL adult learners. The second study also shows that research regarding phonemic awareness also had been conducted previously in order to find its relationship with word processing ability. However, further research on the relationship of phonemic identification skill toward reading comprehension ability on higher level students has not been explored, yet, there is an assumption that the students' awareness on Phonemic Identification Skills influence their reading comprehension since it helps the students to recognize words better. Therefore, this present study aims to validate the assumption that there is the correlation on EFL students' phonemic awareness and reading comprehension, and how one of the variables can predict to the other variable's score.

METHODS

Participants
The participants of this research were the students of English Language Education Program, Universitas Brawijaya, Indonesia, particularly the 3rd semester students who took Introduction to Linguistics and Reading Comprehension subjects. The researchers took total sample consisted of 100 students. The participants selected assumed to have been given exposure about English phoneme and also reading comprehension skills in order to reach adequate representations on each score.

Research Design
A regression analysis was implemented using IBM SPSS Statistics version 21.0. It is a set of statistical method used to estimate the relationship between one dependent variable and one (or more) independent variable. In this current research, the dependent variable is reading comprehension and the independent variable is phonemic awareness.

Research Instrument
Phonemic Awareness Test
The instruments used to obtain the data about phonemic awareness skill were adapted from Rokhman et al. (2020); which previously was conducted based on Phonemic Awareness Test by Heggerty & VanHekken (2003). There are three skills to be measured in this research, including:
Identification skill:
- *Onset fluency or initial sounds identification*
  This onset or initial sound identification was obtained by isolating the initial or first phoneme in a word. For example, the onset or initial phoneme in the word mad is /m/.
- *Medial sounds identification*
  Medial sounds identification was measured by isolating the medial phoneme in a word. For example, the medial sound in the word big is /ɪ/.

- *Final sounds identification*
  While final sounds identification was obtained by isolating the final phoneme in a word. For example, the final sound in the word hat is /t/.

In doing phonemic awareness test, participants of the data were asked to do the test that measured 3 types of identification skills in phonemic awareness, including onset or initial, medial and final sound identification. This test originally included 30 numbers in total, which 10 numbers in each of the 3 types. However, after the data being checked on its validity and reliability, one of the instruments in onset or initial sound identification did not meet the validity requirement; therefore, it had to be eliminated. Finally, the total number of the test used is 29 numbers and all of the instruments were tested in form of online quiz, using audio and multiple-choice test that enable students to identify the sound.

Reading Comprehension Test
To evaluate students' reading comprehension on the expository texts, the test used six-step question system of Revised Bloom taxonomy. This reading comprehension test is focused on students' identifying skill on the topic, main idea, supporting ideas/details (understanding problem solution, description, comparison, sequence, and cause effect), organization of the text, implied details (understanding problem solution, description, comparison, sequence, and cause effect), the writer's tone of writing, pronoun reference and word meaning. These instruments used to measure reading instruments were previously guaranteed through item difficulty and item discrimination analysis, and it was tested in form of 45 numbers of multiple-choice tests in total.

Data Collection
The procedures in obtaining the data for this research begins with selecting participants of the data, which is the 3rd semester students of 2019/2020 academic year from English Language Education Program particularly students that have enrolled Introduction to Linguistics and Reading Comprehension subjects. After selecting the participants, the researchers began to collect both of the data through phonemic awareness test and reading comprehension test, which were conducted through online quiz and test.

The data collection was conducted in two different tests. The first test is the phonemic awareness test which obtained to measure students' skill on recognizing onset or initial, medial and final sound of words presented. While the second test is the reading comprehension test which focused on measuring students' reading skill on the expository texts by using six-step question system of Revised Bloom taxonomy.

The score from each variable was further analyzed to find the correlation which measured in form of statistical data. Furthermore, the data is analyzed using bivariate correlation; therefore, the result of this study is expected to have linear relationship. Bivariate correlation, zero order correlation, or an 'r' is the product moment correlation coefficient which defined as the statistic that shows

correlation statistics as a linear relationship (Creswell, 2012). Regression analysis were also obtained in order to evaluate the relative impact of students' phonological awareness on their reading comprehension, which was done by predicting scores based on correlating correlation coefficients (Creswell, 2012; Zou et al., 2003).

Data Analysis

In this research, the data is analyzed as follows:

Examining data

After administering both phonemic awareness and reading comprehension test, the data was being examined according to the key answers and the correct answer will be taken on average.

Calculating data

The phonemic awareness test was calculated on its average. Each correct answer get 1 score, which total 29 scores; 9 scores on onset fluency (initial sound identification), 10 scores on medial sound identification and 10 scores on final sound identification. While the reading comprehension test was also being calculated on its average by giving 1 score on each correct answer. The total score on reading comprehension is 45. While the maximum scores of both test are 90.

a. Calculating the English phoneme identification score

$$\frac{Onset\ fluency\ (initial\ sound) + medial\ sound + final\ sound\ identification}{29} \times 90$$

b. Calculating the reading comprehension score

$$\frac{Correct\ answers}{45} \times 90$$

Analyzing Data

Thus, the data analysis continued by listing the collected scores from phonemic awareness and reading comprehension test into Microsoft Excel file. The listed scores are therefore analyzed using IBM SPSS to be identified the correlation between the two variables. The first analysis is to calculate whether there is significant correlation between phonemic awareness and reading comprehension and whether the correlation shows positive or negative correlation. Then, after knowing the correlation coefficient, the researcher measures the r2 (Pearson correlation coefficient squared) which is used to report the regression weights of variables in regression analysis (Creswell, 2012), and interpret the result afterwards.

Validity and Reliability

Validity Test of Phonemic Awareness Instruments

Validity of a research instruments is generally defined as the extent to which an instrument measures what needs to be measured (Mohajan, 2017) in a certain observation with the purpose to get a valid or truthful result. In this study, the validity test was done to measure the research instruments which in form of questionnaire that was given to respondent to answer. This test was conducted using Pearson Product Moment Correlation using IBM SPSS by analyzing the correlation between each item score of the questionnaire and the total score. The validity of each item is analyzed through

the correlation coefficient between each item and the total score. In this research, the validity test was done to analyze the variable in phonemic awareness.

TABLE 1 | Validity Test of Phonemic Awareness Instruments

Question Item	R value	R table	Sig.	Validity
Question_1	.598	.256	.000	Valid
Question_2	.484	.256	.000	Valid
Question_3	.539	.256	.000	Valid
Question_4	.736	.256	.000	Valid
Question_5	.744	.256	.000	Valid
Question_6	.475	.256	.000	Valid
Question_7	.390	.256	.002	Valid
Question_8	**.211**	**.256**	**.109**	**Invalid**
Question_9	.585	.256	.000	Valid
Question_10	.685	.256	.000	Valid
Question_11	.530	.256	.000	Valid
Question_12	.551	.256	.000	Valid
Question_13	.491	.256	.000	Valid
Question_14	.501	.256	.000	Valid
Question_15	.463	.256	.000	Valid
Question_16	.383	.256	.003	Valid
Question_17	.402	.256	.002	Valid
Question_18	.642	.256	.000	Valid
Question_19	.507	.256	.000	Valid
Question_20	.493	.256	.000	Valid
Question_21	.341	.256	.008	Valid
Question_22	.380	.256	.003	Valid
Question_23	.399	.256	.002	Valid
Question_24	.421	.256	.001	Valid
Question_25	.258	.256	.048	Valid
Question_26	.277	.256	.034	Valid
Question_27	.305	.256	.019	Valid
Question_28	.362	.256	.005	Valid
Question_29	.441	.256	.000	Valid
Question_30	.398	.256	.002	Valid

From the Table 1, it can be concluded that all items from phonemic awareness instruments were all valid except the question number 8 which shows that the r value (0.211) < r table (0.256). Therefore, from this result, action were taken to make all the questions from the questionnaire valid by removing the question from number 8, which make the total question changed from 30 items to 29 items.

Reliability Test of Phonemic Awareness Instruments

The next step after conducting validity test to the existing questionnaire is administering the reliability test. This action is taken to measure the extent to which the instruments used for this research is stable (error free) and can give consistent results (Mohajan, 2017), which means that the output score reflects the true score of the respondent. In this research, the questionnaire from phonemic awareness instruments were measured based on Cronbach's Alpha using IBM SPSS.

TABLE 2 | Reliability Test of Phonemic Awareness

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.733	.891	31

From this result, the decisions were taken from the following consideration:
- If Cronbach's Alpha value (r alpha) > 0.60, the questionnaire were reliable.
- If Cronbach's Alpha value (r alpha) < 0.60, the questionnaire are not reliable.

As seen in the Table 2, the result can be concluded that the r alpha is 0.891, which means that it is more than 0.60 and can be said that the instruments of phonemic awareness is categorized as reliable.

Item Analysis

In this research, item analysis was administered in order to analyze the instruments used in reading comprehension test; which is a set of multiple-choice questions that includes 45 items. The purpose of item analysis is to help in considering the role of each items with respect to the entire test and revising or excluding the ineffective items (Boopathiraj & Chellamani, 2013), in order to get the appropriate test that can measure what needed to be measured. In doing item analysis, each item need to be analyzed based on the two following specifications:

1. Item difficulty analysis
2. Item discrimination analysis

Item Difficulty Analysis of Reading Comprehension Instruments

According to (Boopathiraj & Chellamani, 2013), item difficulty is described as the percentage of the respondent that marked the item or question correctly. The percentage is ranged from 0% to 100%; the lower the value, the more difficult the item. Too easy or too difficult item indicates that it is not worth to be given as a test and should be reviewed, while the ideal item should have moderate item difficulty.

TABLE 3 | Item Difficulty Analysis of Reading Comprehension Instruments

Item number	Proper Correct (Item difficulty) index	Interpretation	Action
1	.44	moderate	ok
2	.69	moderate	ok
3	.70	moderate	ok
4	.44	moderate	ok
5	.35	moderate	ok
7	.45	moderate	ok
9	.70	moderate	ok
10	.80	easy	ok
11	.64	moderate	ok
12	.42	moderate	ok
13	.72	easy	ok
17	.80	easy	ok
18	.78	easy	ok
19	.57	moderate	ok
20	**.91**	**easy**	**revised**
21	.24	difficult	ok
22	**.12**	**difficult**	**revised**
27	**.87**	**easy**	**revised**
28	.20	difficult	ok
29	**.81**	**easy**	**revised**
30	.28	difficult	ok
31	.45	moderate	ok
34	.39	moderate	ok
35	.51	moderate	ok
36	.39	moderate	ok
37	.26	difficult	ok
38	**.13**	**difficult**	**revised**
40	.43	moderate	ok
41	.75	easy	ok
44	**.23**	**difficult**	**revised**

From Table 3, it can be seen that some items interpreted as easy and difficult were given actions to be reviewed and revised, as in the item or question number 20, 22, 27, 29, 38, and 44.

Item Discrimination on Reading Comprehension Instruments

Item discrimination refers to the degree to which the score achieved reflects and discriminates the ability of the respondent being measured. The value of item discriminations analysis ranged from 0.0 to 1.0, means that the higher the value, the higher the discrimination of the item is (Boopathiraj & Chellamani, 2013). The higher value of item discrimination also can be interpreted that high achiever learners are potentially got the item correct and the low achiever group got the item incorrect.

TABLE 4 | Item Discrimination of Reading Comprehension Instruments

Number	Discrimination Index	Interpretation	Action
1	.52	very good	accepted
2	.42	very good	accepted
3	**.27**	**ok**	**reviewed, revised**
4	.37	good	accepted
5	.36	good	accepted
7	**.16**	**ok**	**reviewed, revised**
9	.32	good	accepted
10	**.25**	**ok**	**reviewed, revised**
11	**.27**	**ok**	**reviewed, revised**
12	.62	very good	accepted
13	.53	very good	accepted
17	.37	good	accepted
18	.35	good	accepted
19	**.24**	**ok**	**reviewed, revised**

20	.15	ok	reviewed, revised
21	.11	ok	reviewed, revised
22	.08	poor	reviewed, revised
27	.15	ok	reviewed, revised
28	.18	ok	reviewed, revised
29	.30	good	accepted
30	.39	good	accepted
31	.42	very good	accepted
34	.70	very good	accepted
35	.32	good	accepted
36	.49	very good	accepted
37	.34	good	accepted
38	.26	ok	reviewed, revised
40	.34	good	Accepted
41	.32	good	Accepted
44	.33	good	Accepted

In the Table 4, the item discrimination analysis shows that the items having value below 0.30 are considered to less discriminating the respondents' ability. Therefore, further actions as review and revision are taken in order to meet the appropriate qualification.

RESULTS AND DISCUSSION

In this present study, the simple linear regression analysis were obtained in order to evaluate the strength of the correlation between phonemic awareness skill towards reading comprehension skill, which was done by predicting scores based on correlating correlation coefficients.

TABLE 5 | Model Summary of Simple Linear Regression Test between English Phonemic Awareness (X) and Reading Comprehension (Y)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.352[a]	.124	.115	6.519

a. Predictors: (Constant), Phonemic Awareness

As can be seen in the Table 5, the correlation coefficient (r) between the two variables is .352, while the correlation coefficient squared or coefficient of determination (r2) shows .124. The value in coefficient of determination defines that the independent variable (phonemic awareness) affects the dependent variable (reading comprehension). This means that reading comprehension skill determines by 12.4% (r2 = .124) of their phonemic awareness ability.

TABLE 6 | Result of Simple Linear Regression Test between English Phonemic Awareness (X) and Reading Comprehension (Y)

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	60.267	3.041		19.820	.000
Phonemic Awareness	.211	.057	.352	3.722	.000

a. Dependent Variable: Reading Comprehension

As displayed in the Table 6 above, it is shown that there is a correlation between phonemic awareness and reading comprehension, with the significance value showing .000 > 0.05. A regression equation formula can be obtained from this data based on the coefficient table equation $Y = a + bX$. Therefore, the regression equation formula between phonemic awareness (X) and reading comprehension (Y) can be formulated as:

$$Y = 60.267 + 0.211 \, X$$

From the equation formula $Y = 60.267 + 0.211 \, X$, it means that if the X (phonemic awareness) value increases by 1 point, the Y (reading comprehension) value will also follow to increase by 0.211. This unstandardized regression coefficients indicated positive relationship. Therefore, it can be said that phonemic awareness skill has a positive impact toward reading comprehension skill. This also suggested that the better score learners' achieve in phonemic awareness task, the better score they also achieve in reading comprehension task.

Learners' ability to comprehend text leads to the better language and literacy skill. However, as Indonesians are majority having English as their non-native language, many obstacles are frequently experienced as there are several differences in the Indonesian and English language systems, including phonemic systems. As having phonemic awareness is the fundamental language skill, this issue further can bring a challenge to Indonesian learners to acquire English as a foreign language. Furthermore, if the individuals develop their ability in identifying phoneme in isolation, it will consequently promote their understanding on the words in isolation which will also support the comprehension on sentences and text.

In this present study, the researchers examine whether or not phonemic identification as the fundamental of phonemic awareness skill, correlates and contributes to the reading comprehension outcomes on Indonesian EFL adult learners. The statistic result indicates that there is a positive correlation between phonemic identification and reading comprehension skills as it shows r = .352 with the significance value .000, while the linear regression analysis shows the equation Y = 60.267 + 0.211 X. This result is showing a significant correlation between the two variables, which also reveals that phonemic awareness significantly, promotes indirectly to the reading comprehension outcomes.

The ability to identify onset or initial, medial and final sound in isolation in English language supports learners to link its letter sound which help them to develop their recognition on alphabetic code. This statement is in relation as explained by Alhumsi & Effendi (2016) that the knowledge of understanding phoneme, whether it is in isolation or blended, promotes to the letter knowledge. As learners have acquired the understanding on the letter sound and its sound, they begin to understand the alphabetic principles, which this ability is applicable as the foundation to perform phoneme manipulation (Hulme et al., 2005). Rokhman et al. (2020) also explains in their previous findings that phoneme identification is found to contribute to phoneme segmenting and blending. Therefore, it can be said that phoneme manipulation (phoneme segmenting and blending) is better performed with learners' better knowledge on understanding letter sound, which in this relation; phoneme identification is also highly required in the process.

Furthermore, by being able to do phoneme segmenting and blending, this will also supports them in the word recognition and processing acquisition. As explained in the research by Mellard et al. (2010), Gough and Tunmer's (1986) theory elaborates that reading comprehension are formed up through word recognition and listening comprehension. Word recognition helps to interpret text as linguistics form, while comprehension supports in making clear this linguistics information. Therefore, as phonemic identification skill increases, the comprehension on text reading will also increase, which can be said that this current study suggested that phonemic identification gives indirect effects to the successful reading comprehension.

Since reading comprehension acquires the understanding of the text meaning, therefore the process should begin with the understanding on the words and its meaning in association. After that, the comprehension can level up to the phrases, clauses and text level. However, in order to acquire the meaning accurately and to be able to catch the meaning in the words included correctly, cognitive and metacognitive skills are also needed in the process, as each text varies in terms of its context.

CONCLUSION

In conclusion, phonemic awareness is a pivotal skill in learning a language, in this context is English phoneme, that becomes one of the predictors on Indonesian EFL adult learners' reading comprehension outcomes. One of phonemic skills is especially pointed out, which is the ability to identify phonemes in words that includes three points: onset or initial, medial and final identification. These three skills are essential as it helps learners in identifying phoneme sounds in isolation which further supports in the phoneme manipulation. Furthermore, after being able to manipulate phonemes, learners consequently are able to do word recognition and processing, which become one of the components in the process of comprehending reading text. This research reported the result of the correlation of

phonemic awareness to the reading comprehension only, the further elaboration on this field is suggested for the future research that can explore the suprasegmental levels in the phonological level in relation to reading comprehension.

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