Phonological and Orthographical Impacts on Reading Comprehension of Second Language Learners of English: A Psycholinguistic Analysis

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ABSTRACT

The current study revolves around the impact of phonology and orthography on the reading comprehension of second language learners. This study is carried out with the Triangle model as its theoretical framework. It was a quantitative study in which the data was gathered through the distribution of a questionnaire. The critical element in the study was that homophones were used. When the sentences were read out loud, they made perfect sense. However, when orthography was focused on, they were nothing more than nonsense sentences. This study concluded that a language's phonological aspect plays a significant role in the reading comprehension of a second language learner. Hence the hypothesis of the researcher was wrong.

Keywords: Reading comprehension, Phonological aspect, Orthographical aspect, Homophones, Second Language Learners.

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Introduction

Innovation in the field of Psycholinguistics has led 21st-century linguists to figure out the learning designs and patterns of the human brain and psychology profoundly, clearly, accurately, and efficiently. Publication of new research and innovations in technical mechanical contraptions spare people from mere speculations about the working of the human brain and psychology (Ruddell et al., 2014). It has made the experimentation process more accessible and less time-consuming. This improvement has allowed psycholinguists to take bold steps and start research about new areas. The current investigation intends to determine the impact of phonological and orthographical implications on reading comprehension in second-language learners of the English language. This study is carried out with the help of homophones (Hall, 2011). Merriam-Webster (2013) defines homophones as one of two or more words pronounced alike but different in meaning, origin, or spelling.

1.1 Problem statement

The impact of the phonological aspect has not been observed strictly on English second language learners. Many studies have been conducted on reading comprehension, but their perspective was not pedagogical. At the same time, this study is interested in psycholinguistics and the pedagogical philosophy of reading.

1.2 Significance of the problem

This study used the Triangle Model on the BS students of Government Degree College Havelian to test the hypothesis that the phonological aspect does not interfere with the reading comprehension of second language learners. It would serve as a firm base for further studies. Secondly, it will help the teachers understand the cognitive process of a second language learning students to develop better teaching methodologies.

1.3 Research Objectives

Research is carried out to explore the impact of phonological elements on reading comprehension in second-language learners of English. The current study involves a sample of the population pursuing English as their degree.

1.4 Research Questions

Current research work aims to accomplish the following research questions,

    i.   Is the previous context helpful in recognizing a word?

ii. Do we recognize words by their overall word form or the individual letters that make up the word?

1.5 Researcher's stance

The researcher has carried out all the work with the help of the theoretical framework of the Triangle Model called *Connectionist Models of Word Reading* by Seidenberg, presented in 2005. The researcher hypothesized that the phonological factor does not impact reading comprehension in second-language learners. An activity was held at Government Degree College Havelian to test this effect on second-language learners. The participants were English department students in the sixth and eighth semesters.

1.6 Delimitation

The appeared empirical results herein could be given with caution of certain delimitations. These include:

i. The study is limited to analyzing BS students from only one college. The limitation of the sample occurred due to the Pandemic.

ii. The analysis is limited to only English students. It excludes other second-languagelearners because of the nature of the activity that will be used to gather data.

iii. The inquiry will only consider one aspect of the study, i.e., only the homophones will be used in the sentences to experiment.

Literature Review

2.1 Phonology and Orthography

Phonology is the study of sound patterns within and across languages. The categorical structure of utterances in languages and how speech sounds are arranged in mind and utilized to convey meaning are all subjects of phonology. Finding the guidelines that govern how sounds are organized in languages is the aim of phonology. It also elaborates on the differences that arise in speech sounds. One starts by examining a single language to see which sound units are employed and what patterns form the language's sound system. On the other hand, orthography is defined as the practice of correct spelling, a technique of spelling, or a science of spelling. Spelling uses written symbols to represent a language or its sounds (Kennedy, 2017).

An orthography is a collection of rules for writing a language that includes spelling,

capitalization, word splits, emphasis, and punctuation. Most transcontinental languages now have writing systems, and a standardized orthography has been developed. This orthography is typically based on a standard language variant, demonstrating less dialect variability than the spoken language (Condorelli, 2022).

2.2 Reading Comprehension

Reading is analyzing a string of written symbols and extrapolating their meaning. Reading involves acquiring written symbols (alphabets, punctuation, and pauses) with the eyes, which are subsequently translated into words, phrases, and paragraphs that convey the information. Reading is a receptive skill, meaning it enables one to absorb information. However, speaking is necessary for the complex act of reading to enunciate the words one reads. Reading is a productive talent in the sense that one is receiving and transmitting information while reading at the same time (English Club, 2020).

Reading comprehension refers to an individual's ability to understand and make sense of what they have read. Young readers need to develop skills in decoding text, making inferences and hypotheses based on what they've read, and critical thinking to fully grasp the meaning of what they have read. Comprehension involves combining reading with thinking and reasoning. If you don't know what you're reading, the task might appear like a tedious, pointless exercise in word calling. It is not an exaggeration to say that reading comprehension dramatically affects a student's future success in all aspects of life. To help students become proficient and passionate readers, one of the critical purposes of reading comprehension instruction is to provide them with the information, skills, and experiences they need to do so (Clarke et al., 2013).

2.3 Second Language Learning

A person's second language is any language that isn't their first. Linguists and teachers often use the phrases L1 and L2 to allude to a person's "mother tongue" and "second language," respectively. In contrast to a foreign language, a language is spoken in a separate nation (Barkaoui, 2019). For instance, an English speaker residing in Japan may consider Japanese a foreign language since it is not spoken in the United Kingdom, where he was born. There are two ways of mastering a language: acquisition and learning. The procedure through which people learn to recognize and interpret linguistic cues (i.e., to become linguistically aware and literate) and to create and use their own linguistic resources (i.e., words and sentences) is known as acquisition (Gass & Selinker, 2021).

Second language learning is similar as well. It just takes place when a language has already been acquired. It's the practice of learning a new language after you've already mastered it. It often happens when a kid who doesn't speak English goes to school for the first time. It also occurs when an adult moves to a new country that does not express his/her first language. At the same time, learning is a conscious process. Learning a language encompasses learning about its sound system. It is primarily a mental challenge (Masood et al., 2020).

2.4 Psycholinguistic Analysis

Kantor coined the term Psycholinguistics. Nicholas Henry Pronko, a student of American psychologist Jacob Robert Kantor, popularised the term Psycholinguistics in his book *Language and Psycholinguistics: A Review*. Psycholinguistics studies the mental processes associated with language comprehension, synthesis, and learning. It deals with the mental elements and relationship between language and communication. It mainly focuses on how language is represented and processed in the brain. It is a branch of cognitive research that combines the fields of linguistics and psychology (Levelt, 2013).

Psycholinguistics draws on concepts and expertise from various related fields, including phonetics, semantics, and pure linguistics. Psycholinguists and neurologists, who investigate how language is represented in the brain, constantly exchange knowledge. There are also strong ties to artificial intelligence research. Indeed, much early interest in language processing stemmed from the need to create computer algorithms to convert speech to writing and recognize the human address. A psycholinguistic analysis means conducting research in this subject's domain. The topic of this study can also be studied under the lens of pedagogy. However, the researchers are interested in the psycholinguistic study (Field, 2003).

2.5 Research Literature

The basic mechanisms involved in reading words and identifying spoken words were examined in this study in light of two models the dual-route cascaded model and the triangle model. It was seen that reading allowed one to see each word as a whole, but spoken words were spread out over time and were short-lived (Ullah et al., 2022). It shows the importance of studying reading from a research perspective because it highlights the phenomenon of the relationship of visuals with reading comprehension. It was noted that visual word recognition was thought to be dependent on phonological synthesis. Furthermore, during word recognition, bottom-up and top-down processes, communication occurs, according to the dynamic activation model. The signal to

begin is when lexical access is complete. It transfers focus covertly to the following letter, and the completion of frequency testing is the signal to trigger an eye-movement schedule. It shows two main theoretical approaches to reading aloud in brain-damaged and healthy people. These models show that patients with various degrees of brain injury have different patterns of speech perception disorder (Eysenck & Keane, 2000).

Reading difficulties can be explained by single or combined contributions of comprehension and phonological problems. In computational models of reading, phonological or semantic deficiencies have been effectively examined in isolation, and the results map onto the predictions of the simple model. On the other hand, the nuanced interactions between impaired representations have yet to be adequately studied. For a large sample of monosyllabic words in English, we constructed a connectionist triangular model of reading that learns to map across word representations in their orthographic, phonetic, and contextual forms. The model's capacity to consistently represent phonological or semantic information was harmed throughout learning. The model was tested on various naming tasks, including words and pictures. Previous investigations of dyslexia caused by a phonological deficiency and comprehension problems caused by a semantic deficit were replicated by the model. However, we discovered that impairments in either phonological or semantic representations influenced the fidelity of representations across the model, implying that pure reading problems will be challenging to detect. The implemented model limits the amount of phonological and semantic information that may be combined to explain reading and its deficiencies (Pollatsek & Treiman, 2015).

It is crucial to learn to associate written signs with their corresponding spoken phrases while starting to read (Masood et al., 2020). Multiple lines of research suggest that it is crucial to teach students how to make the connection between letter patterns and their corresponding sounds. It is unclear, however, whether or not fluency in the target language is necessary for this kind of training to be effective. We built a suite of computational learning models that capture the interplay between orthographic, phonetic, and semantic processing to understand this phenomenon better and replicate synthetic and naturalistic orthographic learning environments for adults and children. After the models were instructed on the correlations between letters and sounds or letters and meanings, we tested them. We studied how the models' linguistic abilities influenced our ability to coach them on spelling-sound and spelling-meaning linkages. The simulations demonstrated the importance of oral language skills as a foundation for reading acquisition and suggested that it may

also affect the success of reading training. These results provide computational support to the Simple Reading Perspective and highlight the need to acquire an oral language foundation and spelling-sound instruction together throughout the formative phases of reading instruction (Faust, 2015).

This essay analyzed both theoretical and empirical research of understanding. Reasons for the decline in American students' reading comprehension were considered. In the first half of the study, we examined several theoretical models for performance; down the second, we narrowed in on the controllable factors crucial to achieving our goal. As one of the higher brain activities possible for humans, reading comprehension was recognized as one of the most complex cognitive tasks to teach, test, and analyze. Both international and national literature evaluations for teenagers in the United States showed minimal improvement despite decades of research on reading comprehension. To accomplish their pedagogical aims, many theoretical models for understanding are helpful. In the concluding portion of the study, the authors examined potential solutions for implementing research into practice and strategies for improving education. To raise reading proficiency, it will be necessary for researchers, teachers, and politicians to collaborate on finding sustainable answers to the problem. The consistent focus would be on acquiring background knowledge, expanding vocabulary, drawing inferences, and checking student understanding. There has to be an early and constant focus on developing pattern recognition, language, inference, and observation abilities to enhance learning (Elleman & Oslund, 2019).

This study has emphasized that reading comprehension necessitates a complex collection of skills and processes. To improve reading comprehension, it was deemed necessary to assume various cognitive functions, the most important of which was word reading. It is stated that to learn to read. One must go through five steps. Phonology is the first step in the process of associating sounds with letters. The second method is syntax, described as how words are put together to form phrases. The third phase, working memory, is characterized as an individual's ability to retain information in short-term memory. The comprehension of meaning, or semantics, is the fourth phase. Orthography, the fifth phase, is the comprehension of writing rules and knowledge. Furthermore, reading has been a method involving a thought process of experiences. Visual discrimination, individual word identification, eyes that move steadily down a line of text, pinpoint precision on the way back. Adjustments were all part of the reading process highlighted in this study (Babashamsi et al., 2013).

This study looked at some of the most common models for word recognition, variables such as lower visual acuity and saccadic error combined with other language processing components (such as word identification) to guide readers' gaze. Yet the study concluded that models developed to explain one facet of reading seldom overlapped with those designed to explain another facet of the process. Word-recognition models, for instance, seldom communicated with eye-movement control models, and vice versa. While this was regrettable, it was also somewhat reasonable given that reading is multi-dimensional. Prototypical models of constituents of the scanning procedures have been discussed above in the order specified. The researchers did not go over all the alternative models; instead, they concentrated on the ones thought to be the most representative and well-known (Rayner & Pollatsek, 2013).

Most of the research on reading comprehension and what good readers do as they read was summarized in this research report. However, the article did not expressly state that it was aimed at adults and had the potential to be beneficial to adult educators. The article made a compelling argument for a well-balanced comprehension program. It talked about adult educators using specific instructions in comprehension techniques and providing learners significant time and space for reading, writing, and discussing the text. Many people debated what else should be in place besides comprehension technique training, such as reading genuine writings for factual purposes, reading and writing across a range of text types, and writing that others may understand (Masood & Shafi, 2020).

The writers emphasize the value of the routine in enhancing students' understanding and provide instances of how educators may assist their pupils in developing strategic planning, which is more valuable than memorization of particular techniques. They gave instructors a set of questions to use as a barometer of classroom climate and instruction quality. It was determined that a classroom environment that promotes reading through the use of authentic texts, a range of literary genres, and frequent opportunities for students to engage in meaningful discourse about vocabulary, etymology, and thematic concerns, as well as their own and other's interpretations of the texts they read, are all crucial to this endeavor (Farstrup, 2002).

Research Methodology

3.1 Theoretical Framework

Research models comprised approaches, philosophical dimensions, time horizons, strategies,

data collection, and evaluation of the gathered content using a theoretical framework. "Triangle model" (Seidenberg, 2005) was applied for analysis which links orthography to phonology. Experimental research was carried out with the help of BS students of Government Degree College Havelian. A quantitative Approach was used in analyzing the problem under study. The quantitative method focuses on objective measurements and statistical, mathematical, and numerical analyses of data gathered via polls, surveys, or computational approaches to re-analyze existing statistical data. The goal of quantitative studies is to aggregate numerical data across populations.

Early on, students are charged with taking on the monumental reading school undertaking. One of the essential early abilities is decoding or relating writing to sound, such as speaking a string of letters. Children, according to the "triangle model," learn how to read by decrypting: they connect orthography to phonologist (a word's sound pattern) before developing the adult-like capacity to proceed straight from orthography to understanding (as in sight reading ability).

3.2 Research Design

In the following research study, a quantitative approach deals with objective measurements and statistical, mathematical, and numerical analyses of data gathered via polls, surveys, or computational methods to re-analyze existing statistical data. The goal of quantitative studies is to aggregate numerical data across populations (USC Libraries, n.d.). It was used because this study focuses on finding the relationship between orthographical and phonological impacts on reading comprehension in second language learners. For this matter, a sample of BS students was selected, representing the population of second language learners of Government colleges in the Hazara division.

3.3 Research Method

The research method used for the current study was a survey. Researchers often conduct surveys to collect data from a selected population sample to gain knowledge and understanding of a wide range of topics. It was carried out with the help of questionnaires for the experimental data analysis study. A questionnaire is a research instrument consisting of a list of questions designed to extract information from respondents (Masood et al., 2021). The data analyzed was primarily gathered by the results of distributed questionnaires. It consisted of sentences to be marked right or wrong by students. Then experimental analysis by operational theoretical framework was done. Data gathered from questionnaires was analyzed, compiled, and then depicted in bar graphs

(Siddiq et al., 2021).

3.4 Sampling

Primary data sampling was considered to carry out the research where significant responses were obtained from Government Degree College students in Havelian. They were students of the English Department from the sixth and eighth semesters. The study was limited to only English students so that the data could be pure of English second language learners. The data was gathered from their responses to questionnaires. It primarily consisted of statistical information that had undergone experimental analysis to form the result correctly.

3.5 Data Generation Tools

The tool used for data generation was a questionnaire. This questionnaire consisted of thirty sentences. Five were nonsense sentences that made no sense semantically. Ten sentences were correct. Whereas fifteen sentences made perfect sense when read out aloud but were nonsense when read because homophones were used in them for specific words. Time was written for each sentence, i.e., how much time was taken to judge each sentence. This data was then compiled with the help of clustered columns. Various sets of information are shown as stacked columns of information. Since all data series have the same axis labels, the vertical bars are organized by category (Exceljet, 2021).

3.6 Data Analysis Method

Students of a degree college were briefed about the survey study. They were given a printed sheet with three columns and thirty rows. The first two columns were supposed to mark whether the sentence was correct. The third column was for the time taken. Due to a lack of resources, they were asked to record the time they took for each sentence on their smartphones' stopwatches and write it down. The first fifteen sentences were read aloud as the sample read them themselves. In comparison, the researcher did not read the rest of the fifteen sentences aloud. It judged the phonological by comparing the results of both sets of sentences, and the role of the phonological aspect in reading comprehension could be highlighted.

Findings and Discussion

The current examination analyzes the hypothesis based on the Triangle Method. The theory states that the phonological factor has no impact/effect on reading comprehension in second

language learners. The experiment to check this hypothesis provided enough data to analyze it. The data was collected by distributing questionnaires among BS students of the English language. Students were asked to record the time while attempting the questionnaire. Time was recorded for every sentence. It was divided into sets. The first set consisted of the time of each student for those sentences which were read out aloud. The second set consisted of the time for those sentences that were not read aloud. This data was arranged in clustered columns. On the x-axis was the number of students and on the y-axis was the time taken. Y-axis started from 50 seconds, as it was the lowest time taken. Time was represented in sets of ten seconds (See Graph 1 in the Appendix).

Secondly, the median was taken for both sets. The time of all students was added and then divided by the total number of students. Through this, a definite number was achieved for both cases. This number showed the average time used by students to judge sentences. The median for the sentences read aloud is 92.11, and the average for sentences not read aloud is 81.22. These averages show that the time taken for the sentences read aloud was more than that of the sentences not read aloud, which means that the phonological impact of this activity was a hindrance in the orthographical aspect. Students took more time to judge a penalty when the phonological part was present but less to consider it when no phonological aspect was present (See Graph 2 in Appendix).

Conclusion

From the above discussion, it is concluded that the researcher's hypothesis was wrong. Phonology plays a part in reading comprehension, which is negative in nature. It serves as a hindrance in the way of comprehension. In second language learning, the learner is not very proficient in the second language, so they tend to focus only on one aspect at one time. The Triangle Method revolves around children who are acquiring their first language. This paper proves that it cannot be extended to second language learners. Lastly, another study can be conducted on this topic where the sample is divided into three groups. The first group would read sentences themselves. The second group would only listen to the sentences. The third group would listen and read the given sentences. A comparison of the accumulated data would greatly help in testing the postulate that second language learners only focus on one aspect simultaneously.

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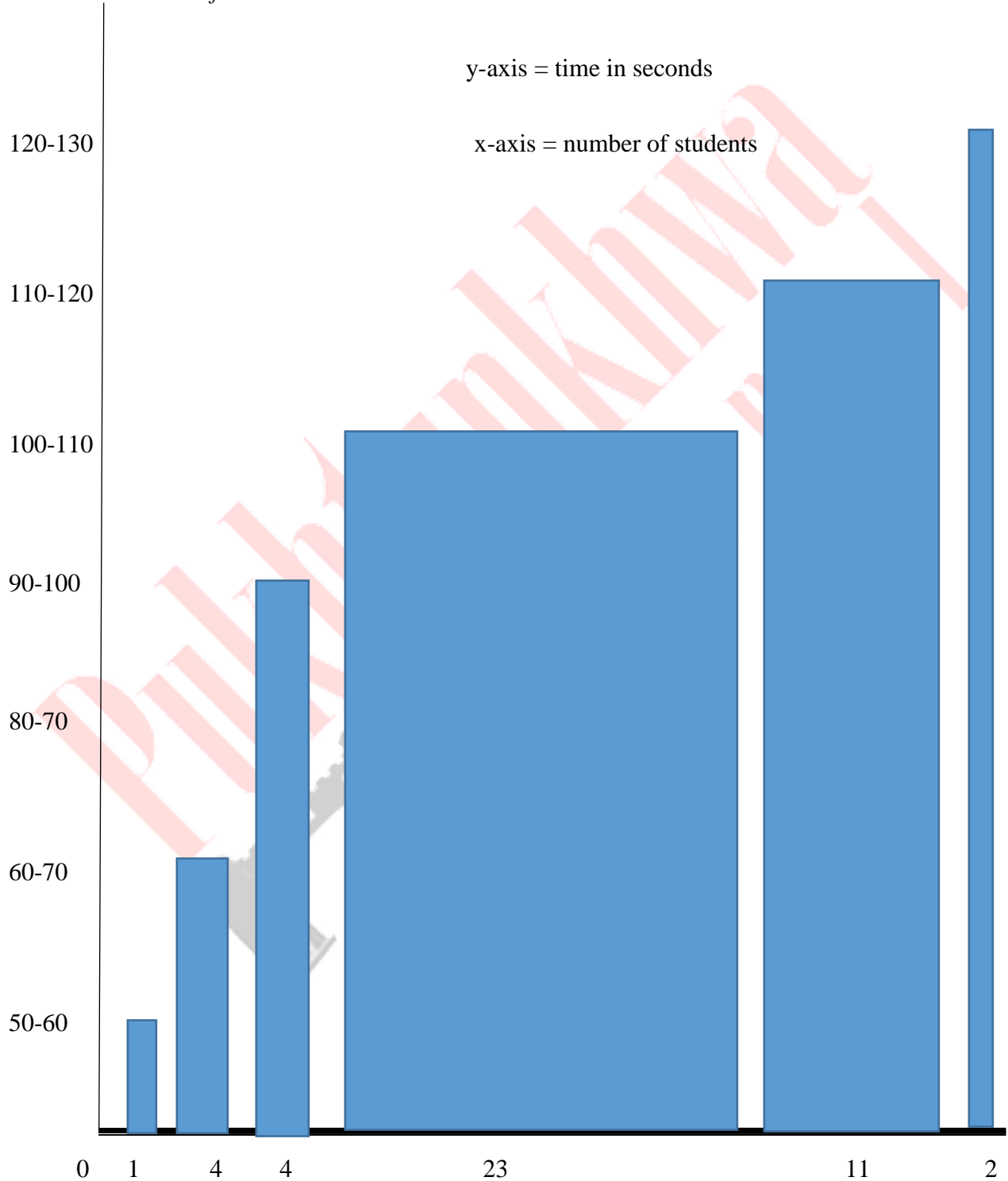
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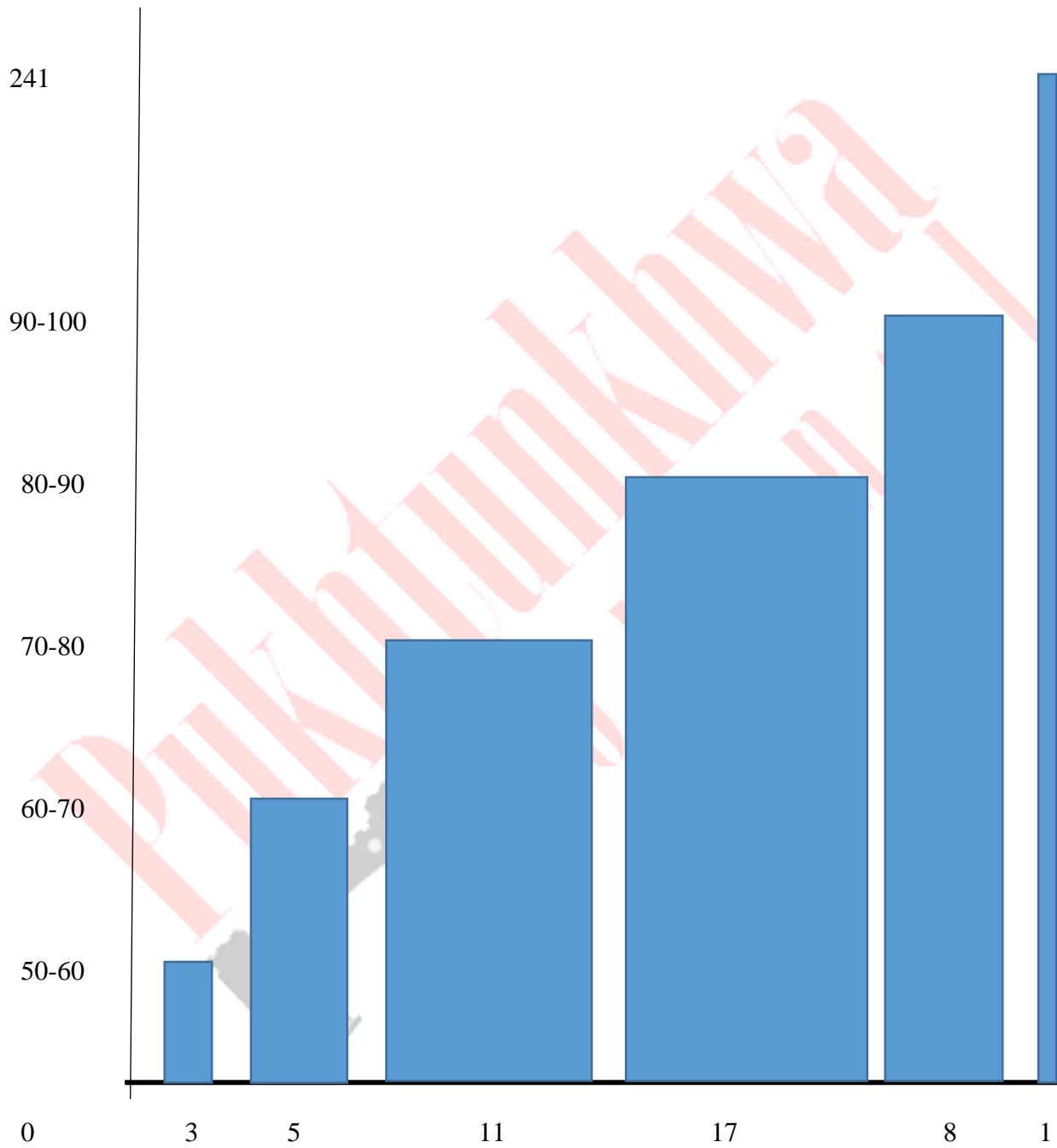
Graph 1

Graph 4.1 sentences read out aloud

Graph 2

y-axis = time in seconds
x-axis = number of students

y-axis = time in seconds

x-axis = number of students

120-130	
110-120	
100-110	
90-100	
80-70	
60-70	
50-60	

0   1   4   4   23   11   2

Graph 4.2 Represents sentences that were not read out aloud