The effect of PQRST technique on recalling what you read

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Abstract. In this study, its examined that, whether or not there is any significant difference between reading with PQRST or repetitive *normal reading*, about recalling. Research grounded on quantitative paradigm. Experimental model used with single subject. Eight texts read four times in a row with *normal reading*, eight texts read with PQRST. After reading each text, ten-question test was done by the subject student. One test was done immediately and the other was delayed for 30 minutes. The results analyzed with Wilcoxon signed ranks test. It was found that repetitive *normal reading* was better than reading with PQRST at recalling in the short term. There was no significant difference about recalling in the long term between PQRST and repetitive *normal reading*. Also, it was found that there was a significant difference when we compare the difference between immediate and delayed tests of PQRST and *normal reading* sessions, in favor of PQRST.

Keywords: PQRST technique, normal reading, recall, single subject research

INTRODUCTION

Reading is the process of decoding and or interpreting as frequently emphasized by educators, psychologists, sociologists, and linguists (Romero & Romero, 2008, 1). Whichever definition is made, reading is linked to short-term, long-term or working-memory (Dehn, 2008, 100). Reading and recalling are related actions. From an educator's point of view, students' effective reading and recalling can be seen as an important advantage in the educational process. Reading and recalling the subject seriously can improve teaching quality. Reading and recalling are important factors to make our lives easier, to perform our profession more effectively or to increase our success in our courses.

People generally remember better what they read at the beginning and at the end. It is thought that the optimal duration in reading-based sessions is 20-40 minutes and it is emphasized that it is better to take a break later (Atkinson, 1990, as cited in Pettersson, 2002, 242). Repetition and rehearsal increase the recall rate (Rider, 2009, 45). If we don't go over what we read again, the forgetting begins. It's a good idea to do it again after you've finished reading it, go over keywords, take notes, even make daily, weekly or monthly repetitions (Pettersson, 2002, 242). Diversifying reading processes with different practices, instead of normal reading, increases efficiency. In this context, it is an educational fact that more participant/active reading is important than standard/normal reading. Retention and educational achievement increase as the student's active participation increases (Gentile & Anderson, 2003, 135; Dale, 1969, 180). PQRST (Preview, Question, Read, State, Test) technique is one of the last examples of practices that enable students to be more inquisitive and interacting during the reading process. The focus of the research, the PQRST technique, is the organization of a series of steps to better remember reading.

PQRST technique is one of the common memory techniques first described by Robinson in 1970 (Wilson, 2009, 82). Technique takes its name from the initials of the words Preview/Pre-read, Question, Read, State and Test. Each letter in this name, which is acronym, also indicates the practice steps of the technique (Ciaramelli, Neri, Marini & Braghittoni, 2015). Similar to SQR3 (Survey, Question, Read, Recite, Review) (Wilson, 2009, 82). SQR3 was developed earlier in 1961

by Robinson, before PQRST (Roe, Stoodt-Hill & Burns, 2011, 232). And one of the most common reading strategies (Martin, 1991, 14). SQ3R is known as İSOAT (İnceleme, Soru sorma, Okuma, Anlatma, Tekrar etme) in Turkish educational literature. Respectively, consists of these stages; *Survey:* a quick look at headlines, subheadings and bold articles (Duquette, 2001, 66), Question: Four questions are asked about the text to be read, like 'What's the main idea? What evidence does the main idea support? What are examples or practices? How does this relate to the rest of the piece, the book, the world, and me?' (Martin, 1991, 14), *Read:* Taking notes for each chapter by reading carefully and directly (Rizvi, 2005, 253), *Recite:* Speaking and listening to the answers to the questions without looking at the text, self-explaining to strengthen the memory and make connections (Martin, 1991, 14), *Review:* After the text has been fully read and finished, go back and review parts of the text and review the notes (Duquette, 2001, 66). When SQ3R's practice logic is analyzed in terms of basic learning theories, it is seen that it is based on information processing model including short-term and long-term memory processes (Kanmaz, 2012, 24). Since the PQRST technique was later developed by Robinson, it could be considered a revised version of SQ3R. However, the final step (review) of the SQ3R and the final step (test) of the PQRST have different practice logic.

The PQRST technique leads individuals to deep analysis through a series of organized steps so that they can better recall and learn (Ciaramelli et al., 2015). The technique is based on three basic principles to strengthen memory. These are: 1. Organizing the material 2. Deepening the material 3. Bringing back information (Pettersson, 2002, 242). The practice steps of the PQRST technique are as follows:

1. *Preview/Pre-read:* Just a few seconds of reading, superficial scanning, or identifying main sections (Simatupang & Sihombing, 2012, 3). Reading the foreword, reviewing the table of contents, reading section summaries, reviewing titles, images, graphs or charts (Turkington, 2000, 111).

2. *Question:* The student asks questions about what he want to know about the text to be read (Simatupang & Sihombing, 2012, 3). For example, suppose we read a piece of text about 'Censorship of Huckleberry Finn'. After a quick look at the text (Preview), the student can ask questions such as 'Why do people ban some books?', 'Why is Huckleberry Finn banned?', 'What did Ernest Hemingway say about Huckleberry Finn?' or 'What did Mr. Twain think of his book being banned?'. Students asking such questions now have a purpose to read. Stages 'P' and 'Q' serve as guidelines for preparing the brain for what to read (Wormeli, 2005, 132). 5W1H technique can be used by students who have difficulty in preparing questions and this can make the step clearer. Questions can be used to address important points of the text, such as what happened, how the incident occurred, who was involved (Turkington & Harris, 2001, 186).

3. *Read:* The step in which the student reads the entire text (Turkington & Harris, 2001, 186). It should be read twice if possible. Reading the text twice strengthens understanding. However, there may not be much opportunity in the real world. Usually people try to finish the job in one reading (Wormeli, 2005, 132). When reading the text for the first time, it should not be noted or underlined. Because it is not easy to understand the important points in the first reading. If a second reading is done, key points can be underlined, highlighted, and notes taken. (Turkington, 2000, 113).

4. *State:* To make a summary of what the student reads, to express the main idea or theme (Simatupang & Sihombing, 2012, 3). There are usually two types of main ideas/themes here. The first is the main idea/theme that belong to the author of the text and the second to the readers. In PQRST technique, instead of a general title, they are asked to find the main idea/theme for each subsection/paragraph (Wormeli, 2005, 132). At this step, the student can ask himself these questions and key questions can be answered aloud. Can express or think aloud on important points. Part time of the PQRST technique practice can be spent at this step (Turkington, 2000, 114).

5. *Test:* Student tests himself with questions or teaches someone else what he has learned (Simatupang & Sihombing, 2012, 3; Wormeli, 2005, 131). At this step, the student is testing

himself whether he can actually obtain the information. It is the questioning of the student before an assessment. This is the working session on the text being read. The person self-questions the information obtained (Turkington, 2000, 114). Prepares to answer the teacher's possible questions (Ahuja & Ahuja, 2007).

The PQRST technique developed by Robinson after SQ3R includes activities such as reviewing, asking questions, taking notes, reading, summarizing, finding main ideas and testing meaningful information. It can be said that these activities help restore the information by transferring the obtained information from short-term memory to long-term memory. In this context, it can be concluded that the PQRST technique is based on the theory of information processing model, just like SQ3R. In addition, the pre-reading and questioning stages before full reading may be considered to have advanced organizer functions. It is not surprising to conclude that the texts supported by the advanced organizers have a high retention (Ausubel, 1960, 271).

When the literature is examined, it is noteworthy that PQRST technique is mostly subject to neurophysiological and psychological researches. One of the most important studies of the technique in the field of psychology is Wilson's single-subject experimental study in 1987 (Wilson's work is detailed in the 'Discussion and Conclusion' section of this study). Wilson studied a total of sixteen columns for eight days with an amnesia patient. Eight of the texts were read with PQRST and eight with normal reading. During the day, one text is normal and the other text is read with PQRST (Wilson, 1987b, 539). The order of text reading techniques changed every day. After each reading session, one immediate and one thirty minutes delay tests were performed and the results were compared. In her study, Wilson concluded that readings with PQRST were often more effective in recalling than normal readings. According to Wilson, in the short term or in the long term, PQRST provided better recall results than traditional and repeated reading. Although the study is remarkable, it is unclear what results will be achieved when the same practices are applied to a normal student instead of an amnesia patient. This uncertainty is the starting point of the research. In addition, when the literature is examined, it is seen that single-subject studies are generally used in the field of special education (Repp & Brusca, 1983; Tawney & Gast, 1984; Çakıroğlu, 2012; Alnahdi, 2013; Sönmez, Kot & Pınar, 2017). In this context, it can be thought that a single subject study on normal students about PQRST technique may contribute to the literature.

This study takes Wilson's research as an example in general. Wilson (1987a, 1987b) was examined the recall difference of PQRST and repeatedly normal reading practices of an amnesia patient at 1987. Differently, in this study, recall difference of PQRST and repeatedly normal reading practices examined with a normal student. In this context, it has been emphasized whether there is a significant difference between PQRST technique and normal reading (four times) practices in terms of recall.

For this purpose, answers to the following questions were sought.

1. Is there any significant difference between reading with PQRST and repeatedly normal reading, in recalling recently?

2. Is there any significant difference between reading with PQRST and repeatedly normal reading, in recalling with delay?

3. When the recent and delayed test results are compared, is there any significant difference between PQRST and repeatedly normal reading?

METHODS

The research is based on a quantitative paradigm. Single subject research was used in the study process. Single-subject research is an experimental model that is increasingly used in recent years in various fields such as clinical psychology, medicine, education, social services, psychiatry and guidance (Cohen, Manion & Morrison, 2000, 219; Kazdin, 1982, 3). And it is a special type of experimental research (Lodigo, Spaulding & Voegtle, 2010, 30). Rather than being

correlational or descriptive, it is a method that proves the relationships between dependent and independent variable in a causal or functional way, considered experimental (Horner, Carr, McGee, Odom & Wolery, 2005, 166). It is generally two-dimensional as baseline phase and treatment phase. In the baseline phase, data is collected without any intervention to the dependent variable, after implementing the independent variable to be investigated in the treatment phase, the data is obtained and compared with the results of the baseline phase (Lodigo et al, 2010, 30).

In this study, reading recall success was dependent variable, PQRST and normal reading practices were independent variables. Since single-subject research is not widely used in education, it may be useful to know its advantages and criticized aspects.

Advantages of single-subject research method:

- The biggest advantage is that deep and comprehensive information can be collected and analyzed (Waalen, 1991, 96).
- Researcher control over the subject,
- To provide meaningful evidence of causal and functional evidence of subject outcomes,
- Strong internal validity and flexibility to adapt to many situations,
- To be able to demonstrate behaviors in an attentive manner,
- Unlike quasi-experimental or pre-experimental designs, there are also advantages such as revealing functional connections between behaviors measured by independent variables. (Alnahdi, 2013, 5-6).

Major criticisms of the single-subject research method:

- Low generalizability,
- External validity cannot be achieved unless similar studies are performed with different measurements of different conditions, individuals or dependent variables (Alnahdi, 2013, 6-7),
- Considered only as pilot studies,
- Practice effects are not suitable for gradual or irreversible situations,
- Can only be used in cases where multiple treatment effects are low,
- Statistical significance tests are not used (Dermer & Hoch, 1999, 50-56).

Research Design

Many designs can be used in single-subject experimental research. These can be classified as: basic designs (A-B), withdrawal designs (A-B; A-B-A; A-B-AB; B-A-B), multi-treatment designs (A-B-A-C-A-C or A-B-A-C-B-C-B), multiple baseline designs, multiple probe designs. However, there is no complete consensus on this classification in the literature (Alnahdi, 2013, 4). In support of this explanation, Wilson's single-subject study on PQRST in 1987, which is the starting point of the study, took a different path from the above classification. Wilson conducted a single-subject research using a direct comparison method as an alternative to multiple baseline designs. The direct comparison method is generally performed by comparing a large number of subjects against two different conditions in group studies. Each condition applies to subjects only once. When the practice is adapted to a single-subjected research, subject receives two practice procedures repeatedly (Wilson, 1987b, 538). In summary, instead of applying the practice to the subjects once and examining the data obtained in groups with a high number of N, two different practices are applied several times to only one subject and the data is examined. In this study, in the same way as Wilson's research, the subject applied two different practices eight times, with repeatedly normal reading and PQRST, and the data were collected by direct tests after these practices and direct comparisons were made.

Subject

Since the study was based on Wilson's experimental practice on amnesia patient, the procedures and stages were applied in the same way as possible, but on a fourth grade of primary school

student with no health, mental problems or learning difficulties. He was accepted as a normal student on the basis of his school status, exams and report cards. Health, mental level, learning disability, etc. no separate test has been conducted. The subject is the researcher's own daughter. This choice was made to ensure that the practice required full control over the subject, the advantage of continuous coexistence and avoiding procedural barriers. The subject student was born on 18.02.2008. Within the framework of the developmental classroom management approach, the tendency of the students at the ages between ten-twelve to act in accordance with the instructor guidelines was an important factor in the selection of the subject (Başar, 2011, 10). The subject student continues his normal education in a school in the city center of Aydın. The reasons for selecting the subject are:

- No ethical or legal distress related to the subject,
- Continuous coexistence of subject and researcher
- The subject is under full control of the researcher,
- The subject is willing to work,
- The subject student does not have a mental disability,
- The success of the subject student is normal (according to the report card and grade indicators),
- Reading-based activities are more prominent in primary education than other teaching levels,
- The student's tendency to act in accordance with the educator's instructions,
- The subject is able to understand the texts to be read,
- Continuous participation of the subject due to the summer holiday.

Data Collection Tools

In the research, newspaper columns were used for the texts to be taught to the subject student, as in Wilson's study, whose research was taken as an example. In the research process, the success of recall was especially emphasized. It is aimed to use texts which are not mentioned in the lessons of the student and that she does not have prior knowledge. In this way, it was tried to avoid the effects of the prior knowledge on the success of recall. This preference is parallel to Ausubel's (1960) study of permanence on the text read. Ausubel (1960, 268) argues that it is critical to work with unusual texts that do not relate to the student's interests, lessons, or prior knowledge. In addition, texts that could be of interest to the student who did not engage in political or controversial issues were sought. As a result of this search, sixteen columns of Edip Emil Öymen (educator, academician and writer), which were written between August 2016 and July 5, 2017, were selected and used with permission from the author. Although the author's writings were used, his only wish was not to add to his writings. In fact, the author's response to the request mail on this subject was: '*Of course, use my articles for your research. But without additions. Because every article can always be written better. I will also wonder about the research results. Success, greetings...*' Edip Emil Öymen (25.07.2017). For this reason, no text was intervened or revised. Moreover, as a result of the examinations carried out before the research, no grammar, spelling, information errors or problems were found in the author's texts, therefore the column writings of the author were preferred. In this context, the reasons why columns are used in the research can be explained as follows:

- The author's educational identity and academic background,
- Correct spelling and grammar in texts,
- Be understandable texts,
- Having remarkable articles on education and technology,
- Texts generally have similar word numbers (487-531),
- Texts to be up to date and impartial

- The texts should be on subjects where the subject does not have prior knowledge (not mentioned in the lessons),
- Consistency of texts because they belong to the same author.

In the study, it was planned to use sixteen texts (column) and ten-question tests, one of which will be applied immediately and one of which will be delayed by 30 minutes. For this reason, a total of 32 different tests have been prepared for sixteen texts (the link for the tests is shown in the last line of Table 1). The test questions are multiple choice and are organized for the knowledge step according to Bloom's taxonomy. The knowledge step of Bloom's taxonomy is that the student recognizes some features about any object and phenomenon, says it when it is asked, or repeats it by heart (Sönmez, 2008, 52). In the tests prepared according to the cognitive taxonomy of Bloom, the knowledge of the facts was mainly included. Knowledge of the facts step is about remembering dates, places, time, people and organizations (Sönmez, 2008, 54). According to the opinions of experts in the fields of assessment & evaluation and curriculum & instruction, the suitability about the prepared tests was examined. Corrections were made according to the feedback.

Experimental Process

In the research process, eight days were studied with the subject student. The study was started on 13.08.2017 and completed on 20.08.2017. Only two texts were studied each day. One text of the day was read by PQRST technique and the other text was read four times by normal reading. The practice sequence is changed daily (the practice sequence can be seen in Table 1). For the student to be under similar conditions, the study was carried out in the near hours every day with the first session between 12:00-13:00 and the second session between 16:00-17:00. When reading with PQRST or normally (and multiple), the texts are selected to have similar number of words.

PQRST technique was explained to the student before he started to study with PQRST and she was allowed to look at a paper explaining the technical steps during the PQRST sessions. During the first practice, the subject looked at the explanation sheet to remember the steps. No further support was provided by the researcher. The subject did not need to look at the paper that wrote the PQRST steps after the second and third sessions. The summary of the PQRST practice given to the student was as follows:

P-Preview: preview the text quickly (5-6 seconds). You can quickly look up headlines, bold or italic expressions.

Q-Question: Before reading, look at the text and ask what, why, how, where, when, who (5W1H). You can ask yourself questions about the main ideas, names, dates, space, events, and so on.

R-Read: You can read the full text. It's best to read it twice. In the second reading, you can take notes and underline what you consider important.

S-State: You can ask yourself questions and comment. You can try to find the main idea, theme or title for each paragraph. You can think quietly or speak to yourself. You can check the text.

T-Test: You have to answer the ten-question test (when the student applies PQRST on his own, this stage is carried out by the student. The student can prepare himself / herself for the questions that can be asked and ask himself / herself).

The student read the text four times in a row in *normal reading* sessions and once in the sessions using the PQRST technique. Wilson indicated that she used four normal reading and one PQRST session because the duration of the two treatments was close (four readings 7-10 min-PQRST 7-10 min) and five stages in both conditions. (Wilson, 1987b, 539). Since Wilson's work is based, the same systematic study was applied. However, in contrast to Wilson's study, it was

recorded that four readings took an average of 24.5 minutes and PQRST readings took an average of 20.1 minutes. When the session times were examined, it was seen that the reading time with PQRST entered a certain standard in the following sessions (26', 18', 27', 16', 19', 19', 17', 19'). In the normal reading sessions, the periods were close to each other (18', 27', 25', 25', 19', 24', 26', 32'). In addition, it was noted that the subject was bored of reading four times in the sessions with normal reading.

In the research process, as soon as PQRST or normal reading was performed, ten-question test was performed without waiting. As in Wilson's research, after a 30-minute interval, another ten-question test was conducted on the same text. The tests were given to the students on computer and online. In these tests, only one question appears on the screen and after it is answered, the next question is passed. There is no option to roll back. The results were immediately checked and recorded. The results were not disclosed to the student so that she was not affected.

In the data collection process of the research, the results of sixteen tests (eight tests immediately / eight tests delayed 30 minutes) after reading with PQRST technique and the results of sixteen tests (eight tests immediately / eight tests delayed 30 minutes) after normal reading four times, were compared and analyzed. Information summarizing the practice process can be found in Table 1.

Table 1. *Information about the practice sessions*

	Date	Practice	Word Count	Start	Finish	Test 1	Test 2
1	13.08.2017	*Normal reading*	456 Words	12:35	12:53	12:56	13.26
	Column: <u>*Rembrandt'ın yeni tablosu*</u> **Remembered in ten questions:**					*10*	*9*
Opinion of the Subject: *Well. I can't say I liked it. I can't say I don't like it...*							
2	13.08.2017	PQRST	483 Words	16:37	17:03	17:05	17:37
	Column: <u>*Ağacın katma değer vergisi*</u> **Remembered in ten questions:**					*9*	*8*
Opinion of the Subject: *I like trees. It was beautiful.*							
3	14.08.2017	PQRST	478 Words	12:51	13:09	13:14	13:46
	Column: <u>*Sanayi 5.0 yolda*</u> **Remembered in ten questions:**					*8*	*8*
Opinion of the Subject: *I don't like cars. So, I can't say I liked it very much.*							
4	14.08.2017	*Normal reading*	488 Words	16.22	16.49	16.50	17.21
	Column: <u>*Berlin kültürle kazanıyor*</u> **Remembered in ten questions:**					*8*	*8*
Opinion of the Subject: *I really like. The history was beautiful.*							
5	15.08.2017	*Normal reading*	498 Words	12:57	13:22	13:23	13:55
	Column: <u>*Her eğitime deva*</u> **Remembered in ten questions:**					*8*	*6*
Opinion of the Subject: *It was beautiful. I'm playing Minecraft. That's why it's so beautiful.*							
6	15.08.2017	PQRST	527 Words	16:07	16:34	16:35	17:08
	Column: <u>*Lüksün de lüksü*</u> **Remembered in ten questions:**					*8*	*9*
Opinion of the Subject: *I really like. It just ran out.*							
7	16.08.2017	PQRST	504 Words	12:22	12:38	12:39	13:09
	Column: <u>*Eğitime hızlı vites*</u> **Remembered in ten questions:**					*6*	*7*
Opinion of the Subject: *I like the last paragraph. I was interested about the text.*							
8	16.08.2017	*Normal reading*	515 Words	16:23	16:48	16:49	17:19
	Column: <u>*Yapay Zekada Sorun*</u> **Remembered in ten questions:**					*10*	*9*
Opinion of the Subject: *I was interested in the subject. More detective... I watch detective series.*							

Table 1. *Information about the practice sessions (as a continuation of)*

	Date	Practice	Word Count	Start	Finish	Test 1	Test 2
9	17.08.2017	*Normal reading*	531 Words	12:00	12:19	12:20	13:53
	Column: *Şehir inovasyonu*		**Remembered in ten questions:**			*7*	*5*
Opinion of the Subject: *I'm interested in the subject. I liked it on a similar level with former texts.*							
10	17.08.2017	PQRST	500 Words	16:55	17:14	17:14	17:45
	Column: *Işıkla ileti sistemi*		**Remembered in ten questions:**			*5*	*8*
Opinion of the Subject: *I'm interested in the subject.*							
11	18.08.2017	PQRST	525 Words	12:28	12:47	12:47	13:17
	Column: *Bitcoin ufo gibi*		**Remembered in ten questions:**			*6*	*7*
Opinion of the Subject: *I don't like the column. It's gone crazy. I did not like.*							
12	18.08.2017	*Normal reading*	522 Words	16:54	17:18	17:20	17:50
	Column: *Sibere güvenlik*		**Remembered in ten questions:**			*9*	*7*
Opinion of the Subject: *This is the same as last text. But I kind of like it a little more.*							
13	19.08.2017	*Normal reading*	523 Words	12:18	12:44	12:44	13:14
	Column: *Turizmde klişe out*		**Remembered in ten questions:**			*9*	*7*
Opinion of the Subject: *It was something I wasn't interested in.*							
14	19.08.2017	PQRST	525 Words	16:06	16:23	16:24	16:54
	Column: *Politik aritmetik*		**Remembered in ten questions:**			*8*	*8*
Opinion of the Subject: *I liked it. It came normal.*							
15	20:08.2017	PQRST	487 Words	12:31	12:50	12:51	13:22
	Column: *Yalan olmayan gerçek*		**Remembered in ten questions:**			*6*	*6*
Opinion of the Subject: *I'm not interested. I am bored.*							
16	20.08.2017	*Normal reading*	476 Words	16:26	16:58	16:59	17:33
	Column: *Trene binen ilk padişah*		**Remembered in ten questions:**			*7*	*6*
Opinion of the Subject: *I think it was beautiful. I understand how valuable my country is. I was particularly impressed by the fact that it was Aydın. That was my favorite post.*							
Tests: *https://drive.google.com/open?id=1XZ1KVvPnQQcn13Adj1Tc_Mbr7HVfTGB1*							

Data Analysis

In this study, non-parametric, Wilcoxon signed ranks test was used as in the case study of Wilson. In this study, since the number of samples was less than 30, and the Shapiro-Wilk and Kolmogorov-Smirnov values were p> .05 according to normality tests, Wilcoxon signed ranks test was used for non-parametric tests. Wilcoxon signed ranks test is a non-parametric equivalent of dependent sample t test (Vaughan, 2003, 146).

RESULTS

In this section, the general purpose of the research and the findings obtained in accordance with the sub-research questions are presented. Figure 1 shows the number of correct answers in the tests performed after PQRST and multiple normal readings.
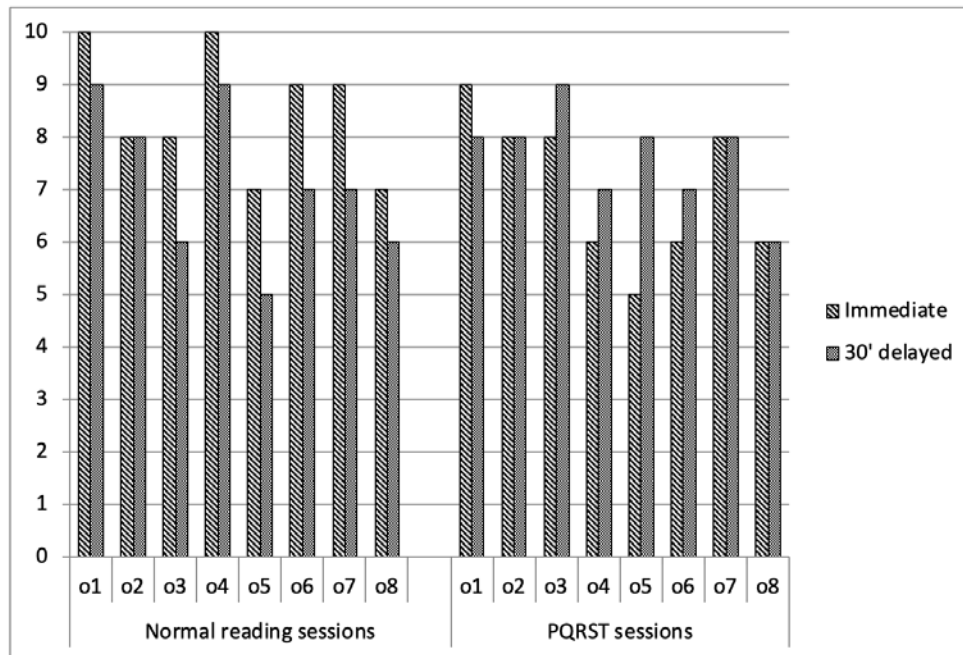
FIGURE 1. *Tests and number of correct answers*

In order to find the answer to the first research question 'Is there any significant difference between reading with PQRST and repeatedly normal reading, in recalling recently?', the results of the tests performed immediately after PQRST and multiple normal reading sessions, were analyzed with Wilcoxon signed ranks test. Statistical analysis of the immediate tests can be seen in tables 2, 3 and 4.

Table 2. *Descriptive statistics*

	N	Mean	Std. Dev.	Minimum	Maximum
PQRST immediately tested	8	7.0000	1.41421	5.00	9.00
Nor. read. immediately tested	8	8.5000	1.19523	7.00	10.00
Total of tests	16				

Table 3. *Ranks*

		N	Mean rank	Sum of ranks
Nor. read. immediately tested	Negative Ranks	0[a]	.00	.00
PQRST immediately tested	Positive Ranks	6[b]	3.50	21.00
	Ties	2[c]		
	Total	8		

a. *Nor. read. immediately tested* <PQRST immediately tested
b. *Nor. read. immediately tested*> PQRST immediately tested
c. *Nor. read. immediately tested* = PQRST immediately tested

Table 4. *Test statistics[a]*

	Nor. read. immediately tested - PQRST immediately tested
Z	-2.226[b]
Asymp. Sig. (2-tailed)	.026

a. Wilcoxon signed ranks test
b. Based on negative ranks

According to Table 2, the average of 7 questions is remembered correctly in the ten-question tests performed immediately after the texts read by PQRST technique, and the average of 8.5 questions is remembered correctly in texts read with normal reading. Standard deviation values are close to each other. In the tests performed immediately after PQRST technique, the

lowest 5 and the highest 9 questions were correctly remembered. In the tests performed immediately after normal readings, the lowest 7 and highest 10 questions (all correct) were remembered correctly. When Table 3 is examined, results in favor of normal readings are observed between the responses recalled after normal readings and those recalled after PQRST. In this context, when Table 4 is examined, there is a significant difference in favor of repeatedly normal reading, between the results of tests performed immediately after normal readings and PQRST (.026).

According to the findings, it is seen that there are better recall rates compared to PQRST in the tests performed immediately after normal reading. In terms of findings, it can be considered that repetitive reading is effective in terms of recall in the short term. In this case, it can be accepted that students' normal reading based on very repetition may have a positive effect on educational achievement in cases where short-term recall is sufficient. It should be noted, however, that PQRST is performed only once, and normal reading is performed four times. It is among the notes in the research process that reading multiple times can bore the student and is time consuming.

In order to find answers to the second research question of the study, 'Is there any significant difference between reading with PQRST and repeatedly *normal reading*, in recalling with delay?', the results of the tests performed 30 minutes after PQRST and multiple normal reading practices were analyzed by Wilcoxon signed ranks test and compared. Statistical analysis of delayed tests can be seen in Tables 5, 6 and 7.

Table 5. *Descriptive statistics*

	N	Mean	Std. Dev.	Minimum	Maximum
PQRST delayed test (30')	8	7.6250	.91613	6.00	9.00
Normal reading delayed test (30')	8	7.1250	1.45774	5.00	9.00
Total of tests	16				

Table 6. *Ranks*

		N	Mean rank	Sum of ranks
PQRST delayed test (30')	Negative Ranks	3[a]	3.50	10.50
Normal reading delayed test (30')	Positive Ranks	2[b]	2.25	4.50
	Ties	3[c]		
	Total	8		

a. *Normal reading delayed test*<PQRST delayed test
b. *Normal reading delayed test*> PQRST delayed test
c. *Normal reading delayed test*= PQRST delayed test

Table 7. *Test statistics[a]*

	Normal reading delayed test - PQRST delayed test
Z	-.816[b]
Asymp. Sig. (2-tailed)	.414

a. Wilcoxon signed ranks test
b. Based on positive ranks

When Table 5 is examined, it is seen that, 7.6 questions were remembered correctly in ten-question tests about the texts read by PQRST technique and 7.1 questions were remembered correctly in tests about the texts read with normal reading (which were done after 30 minutes). When the standard deviation values are examined, it is noteworthy that the standard deviation of PQRST practice is less than that of repeatedly normal reading. In the tests performed after 30 minutes of PQRST technique, the lowest 6 and the highest 9 questions were correctly remembered. In the tests performed after 30 minutes of *normal readings*, the lowest 5 and the highest 9 questions were correctly remembered. When Table 6 is examined, it is seen that the results of PQRST technique are favorable in terms of recalled answers. In addition, when Table 7

is examined, there is no significant difference between the delayed tests' results of PQRST and repeatedly normal readings (.414).

According to the findings, it can be said that there are no differences in recall ratings of the delayed tests (30 minutes). However, it is noteworthy that the results of delayed tests after the PQRST technique have increased compared to the immediate tests (PQRST/immediate test results = 7, PQRST/30 minutes delayed test results = 7.62). This may be interpreted as PQRST provides positive gains in recall. On the other hand, the test scores of the practices based on normal reading show negative results (Normal reading/immediate test results average = 8.5, Normal reading/30 minutes delayed test results average = 7.1). It is noteworthy that although there is no significant difference when the findings are examined, recall rates decreased in normal reading and increased in PQRST readings.

In order to find the answer to the third research question 'When the recent and delayed test results are compared, is there any significant difference between PQRST and repeatedly normal reading?', the differences calculated between the results of the immediate and delayed tests of PQRST and repeatedly normal readings, and then the differences were analyzed with Wilcoxon signed ranks test. Recall differences based on immediate and delayed test results can be seen in Figure 2.
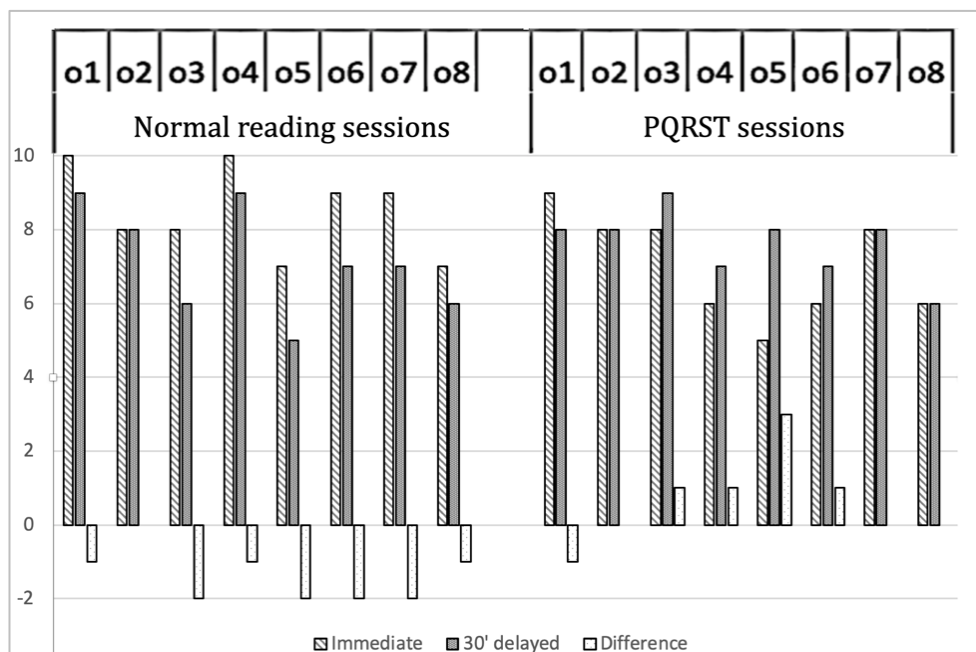

FIGURE 2. *Immediate, delayed test results and differences*

Comparison analyzes of the differences in PQRST and multiple normal readings can be seen in Tables 8, 9 and 10.

Table 8. *Descriptive statistics*

	N	Mean	Std. Dev.	Minimum	Maximum
Normal reading difference	8	-1,3750	,74402	-2,00	,00
PQRST difference	8	,6250	1,18773	-1,00	3,00

Table 9. *Ranks*

		N	Mean rank	Sum of ranks
pqrstdifference - normaldifference	Negative Ranks	0[a]	,00	,00
	Positive Ranks	6[b]	3,50	21,00
	Ties	2[c]		
	Total	8		

a. pqrstdifference < normaldifference
b. pqrstdifference > normaldifference
c. pqrstdifference = normaldifference

Table 10. *Test statistics[a]*

	PQRST pretest-posttest difference *Normal reading pretest-posttest difference*
Z	-2,214[b]
Asymp. Sig. (2-tailed)	,027

a. Wilcoxon signed ranks test
b. Based on positive ranks

According to Table 8, the differences between the tests (immediate and delayed tests) of PQRST and repeatedly normal reading, are clearly distinguished from each other. The results (recall rates) of immediate and delayed tests after repeatedly *normal readings* show a decrease *(-1.37).* However, after the readings with PQRST, the differences (recall rates) of the immediate and delayed tests were increased (+0.62). For the sake of clarity, when Table 9 is examined, the differences in immediate and delayed test results are against normal readings. The subject student did not achieve better results than PQRST in any of the tests in terms of the differences, in the tests performed after normal readings. In addition, when Table 10 is examined, there is a significant difference in favor of PQRST in terms of the results of test differences (.027).

When the findings are examined, it can be said that the readings made with PQRST are often better than normal reading in terms of long-term recall. Interestingly, PQRST readings showed an increase in the differences in recall rates rather than a decrease (+0.62). This may be due to the fact that the PQRST technique allows the student to pass from passive to active reading. As the interaction and responsibility of the student increases, mental encodings and relationships may occur. In addition to remembering well, the increase (+0.62) can be interpreted as the student assimilating information. The student may remember better in the long term because she assimilates the information.

DISCUSSION and CONCLUSIONS

In this part of the study, information about similar studies conducted in the literature is presented and the relations between the research and other studies are established and discussed. First of all, it is useful to remind the aims of the research and the findings obtained in this direction. The aim of this study was to investigate whether there is a significant difference between PQRST technique and repeatedly *normal reading* in terms of recall. According to the findings, in terms of immediate recall success, repeatedly *normal reading* gave better results than PQRST reading. In terms of delayed tests, it was concluded that *normal reading* or PQRST did not make a significant difference in recall success. When the differences between the results of delayed and immediate tests were examined, it was concluded that there was a significant difference between repeatedly *normal reading* and PQRST, in favor of PQRST (.027). As time passes, recall rates decreased in *normal reading* but increased in reading with PQRST (+0.62).

When the related studies in the literature are examined, two similar studies come to the fore in terms of focal points. The first study to be discussed is the research of Wilson (1987), which also inspired this research. The other study was done by Ciaramelli et al (2015). In the

continuation of the discussion of these researches, relations with national and international studies were also examined.

One of the clearest examples of the practice of the PQRST technique is Wilson's single subject research in 1987. Wilson conducted a single-subject study on a patient who was diagnosed with amnesia. In the study, the subject patient read the newspaper article using the PQRST technique (lasting 7-10 minutes). And then, read (four times and normal) another article of similar level and then answered the questions (it took 7-10 minutes). The two practices were completed in roughly five stages and in close times. After both practices, the analysis of the tests performed immediately and after a period of time (Wilcoxon matched-pairs signed ranks test) found that the effect of PQRST technique on recall did not make a significant difference in the short term compared to the classical, repetitive reading technique (PQRST technique: 77.7%-Classic repeated reading: 62.5%). However, it was concluded that there was a significant difference in recall rates in tests performed after periods of more than 30 minutes (p<.05). While the long-term recall rate was 47.1% with the PQRST technique, it remained at 15.6% in the classical repetitive reading (Wilson, 2014, 154). The results can be seen in figure 3.
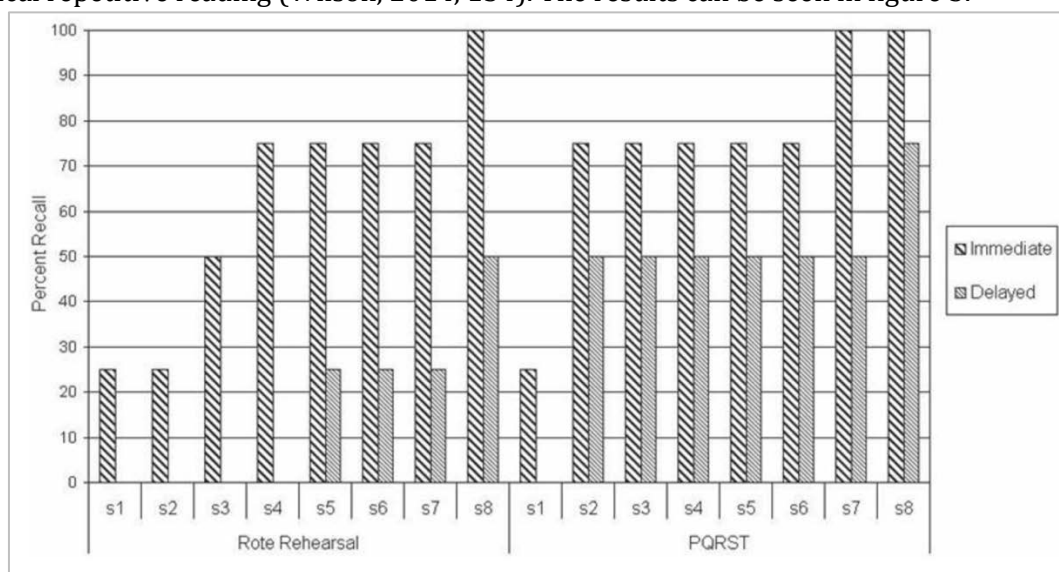

FIGURE 3. *Results of tests after PQRST and rote-based repeat sessions*

(Wilson, B. A. (2009). *Memory Rehabilitation: Integrating Theory and Practice*, The Guilford Press: New York; London, 85)

This study, similar to Wilson's study on amnesia patient in 1987, but practiced on a normal student, acquired some different findings and conclusions from Wilson's study. First, Wilson has recently concluded that there is no significant difference between multiple normal reading and PQRST in terms of short time recall. In this study conducted on the normal student (in the first research question), it was found that repetitive normal reading could be more successful than reading with PQRST (.026) in immediate recall. In addition, Wilson concluded that reading with PQRST is better than normal reading in the long term. In the second research question of this study, no significant difference was found between PQRST and normal reading results in long term (.414). However, when the findings were carefully examined, recall rates obtained from normal readings' test results, were reduced sharply in the long term, while reading with PQRST did not decrease, and even surprisingly, the increases were recorded. Again, in the third research question of this study, it was found that PQRST provides better results than repeatedly normal reading when the immediate and delayed tests' differences considered (.027).

Another recent study of the PQRST technique belongs to Ciaramelli et al. (2015). It was done with seven patients (32-60 years old) who have dysmnesia problems due to prefrontal

cortex injuries. Repetitive standard reading was compared with PQRST technique. Unlike Wilson, patients read with PQRST technique and also listened to it. In one session, patients read themselves using the PQRST technique and in the other session patients listened using the PQRST technique. In both cases, it was concluded that the recall rates of the patients increased by 40% compared to standard repetition based on memorization. In addition, the researchers found that the PQRST technique increased the ability to answer questions by 28%. PQRST is seen to have a significant effect on short-term and long-term recall ($p < .05$). However, no significant difference was found (0.95) between the practice of the PQRST technique (reading or listening) (Ciaramelli et al, 2015). The results of this study can be seen in Figure 4.
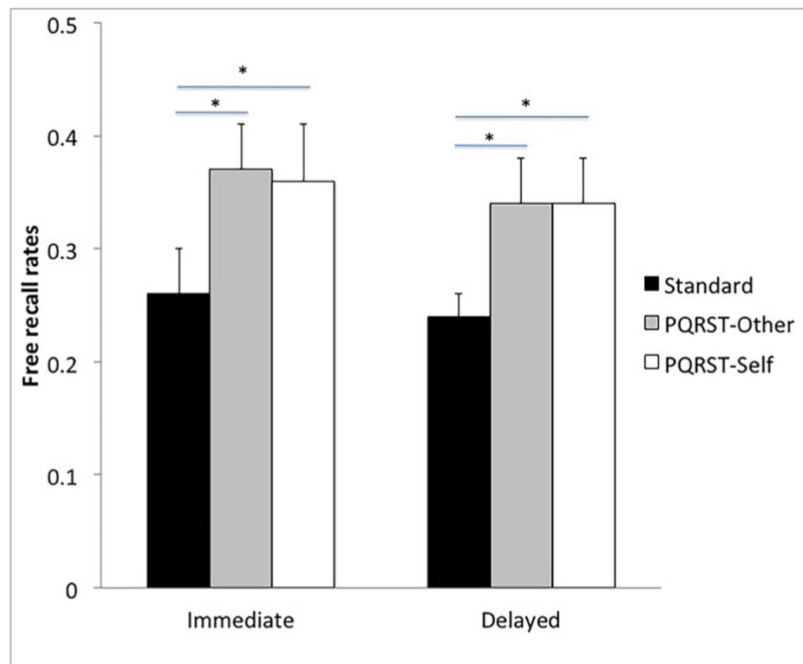

FIGURE 4. *Recall rates after PQRST and rote-based repeat sessions*

(Ciaramelli, E., Neri, F., Marini, L. & Braghittoni, D. (2015) Improving Memory Following Prefrontal Cortex Damage with the PQRST Method. *Frontiers in Behavioral Neuroscience,* 9, 211. http://journal.frontiersin.org/article/10.3389/fnbeh.2015.00211/full 13.07.2017)

The study by Ciaramelli et al. (2015) was performed on patients rather than students like Wilson. It was concluded that PQRST technique, like Wilson, had a positive effect (40% increase) in both short term and long term. However, in this study, conducted on a normal student, it was concluded that normal repetitive reading in the short term may be more effective than reading with PQRST (.026). In the long term, although there was no significant difference, when we compare the difference between immediate and delayed test results (.414), it was found that reading with PQRST provided better recall rates than normal reading (.027).

Apart from the research of Wilson (1987) and Ciaramelli et al. (2015), it may be useful to focus on other studies in national and international literature. When the literature is examined, it is seen that there are studies about SQ3R which is the pioneer of PQRST, and similar techniques (SQ4R, KWL, Story map, STOP, TELLS, TWA, Multiple-pass strategy, etc.). Most of these studies emphasize reading comprehension rather than recall. According to Bloom's cognitive taxonomy, understanding step indicates comprehension level learning and is a learning stage above knowledge (remembering) (Sönmez, 2008, 67). In this study, since the dependent variable was the recall success of the subject student (factual knowledge level according to Bloom's cognitive taxonomy), no direct relationship could be established with many studies in the literature. Researches have been studied on recalling reading and examining similar characteristics with PQRST. In this context;

Lorch and Chen (1986) investigated the effect of marking with numbers on a written text on reading recall. Study conducted on 120 college students, the subjects were divided into two groups and one group read the text by marking the numbers while the other group read normal without marking. According to the findings of the study, it was concluded that reading by marking with numbers increased attention and positively affected the recall process (Lorch & Chen, 1986, 266-267). These results support the idea that reading in the PQRST technique, that is, highlighting important points while reading and taking notes, can have a positive effect on reading recall.

In a similar study by Recht and Leslie (1988), the effects of preliminary information on readers' recall of the text were investigated. In the study conducted on 64 high school students, experimental and control groups were formed with a pre-determined level of knowledge about baseball sport (with little or no knowledge). They were asked to read quietly about the events of the baseball game and then summarize each match. According to the findings of the study, it was concluded that having a prior knowledge had a significant effect on recall (.001) (Recht & Leslie, 1988, 18). Similarly, in the studies of Krug, George, Hannon and Glover (1989), the effect of reading abstracts and titles before starting reading was investigated on the reader's success in remembering. High success rates were found in the recall rates of the students who read the abstracts and titles beforehand (.01). In the same study, it was noted that reading the titles alone did not effect. It is effective when reading the titles and abstracts together (Krug, George, Hannon & Glover, 1989, 118). The results obtained in these two studies can be interpreted as the practice of the PQRST technique during the Preview step (a few seconds of pre-reading, superficial scanning, preface reading, summary reading, if available, reviewing titles, images, graphs or charts) gives preliminary information about the text to the subject and therefore has a positive effect on the recall. This interpretation reinforces the notion of the impact of PQRST on reading recall success.

Swanson and Howell's research in 2001 showed that there was a significant difference (.001) from age advantage in reading studies on recall successes based on working memory and short-term memory of children aged 9 and 14. In the study, it was stated that this result stems from age-related reading performance (Swanson & Howell, 2001, 724). In this context, when using reading techniques such as PQRST, further research is needed to determine which age groups will achieve more effective results. As the study was conducted with a single subject, age-related variables were not included in the study. This detail is attached to the research recommendations.

In the doctoral thesis of Kanmaz (2012), recall tests were applied to the students in the experimental group (n = 27) reading with SQ3R (İSOAT) and the control group (n = 28) who read normally based on the standard curriculum. When the pre-test and post-test scores were analyzed, it was found that there was a significant difference (.00) in favor of the experimental group using the SQ3R strategy (Kanmaz, 2012, 155). In a study conducted by Johnson, Reid and Mason (2012) on TWA (Think before reading, think while reading and think after reading), a similar reading strategy, three students with distractions and hyperactivity problems were given text readings with TWA. Long-term memory effects were measured. In the study, it was concluded that TWA had an effect on short- and long-term recall (Johnson, Reid & Mason, 2012, 263-264). It can be said that the TWA steps have a parallel logic with PQRST and exhibit the basic features of information processing model. When the findings and results of the two studies are taken into consideration, it is seen that TWA and SQ3R strategies have similar results like PQRST technique has, on recall success.

As a result, it is not surprising that the PQRST technique, which has links to information processing model, has an impact on recall. It is conceivable that advance organizers make sense of what is learned in the reading process of doing (Ausubel, 1960, 271) and thus people with mental readiness achieve better recall.

The results reached at the end of the research process are as follows:

Repetitive normal reading is better for recall in the short time than reading with the PQRST technique. Students' normal reading based on very repetition can be useful in situations that require short-term recall. however, reading it normally and repeatedly takes the pupil boring and takes long time. In terms of delayed (30 minutes) tests, normal reading or PQRST reading is no different in terms of recall. Recall rates decrease in normal reading but increase in reading with PQRST. Reading with PQRST is often better than normal reading in terms of long-term recall. What is learned in reading with PQRST is often better remembered than learned with normal reading.

Some suggestions that can be made based on the research are as follows:

The study can be repeated in an experimental study with experimental and control groups in which the number of subjects is increased. It can be deepened with a qualitative research supported by observation and interview techniques. A similar study can be comparatively researched using different subjects, conditions and dependent-independent variables. In addition to the effect of PQRST on knowledge level, research on the relationship between understanding level in Bloom taxonomy can be done. Clarifying studies on the steps of PQRST technique can be carried out. Research on the effect of PQRST technique in different age groups may contribute to the literature. An experimental study of the differences between PQRST and SQ3R, which has very similar steps, may contribute to the field. Practices about single subjected, experimental researches, using different dependent-independent variables can be performed in the field of education.

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