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Using the collaborative learning approach to enhance reading competence, interest, autonomy, and reduction in reading anxiety among secondary school children

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Abstract

Background: Reading is critical for survival in every society. Unfortunately, the reading culture in Nigeria is lamentable. Poor reading skills can truncate students' academic ambitions and ultimately result in economic and political underdevelopment. With large class sizes and the paucity of reading materials in many schools, students' reading proficiency, interest and autonomy would suffer and reading anxiety would increase.

Purpose of the study: The study sought to find out the effect of the collaborative learning approach strategy on reading proficiency, anxiety, interest and reading autonomy of secondary school students in Calabar Education Zone, Cross River State, Nigeria.

Methodology: A quasi-experimental pre-test and post-test research was conducted using nonrandomised intact classes of 192 students. A 50-item multiple choice reading comprehension test with (KR-24 = 0.79) and a 30-item Affects Rating Scale (ARS) with Cronbach alpha reliability indices of 0.73 to 0.83 were administered to experimental and control groups. The One-way Analysis of Covariance was used to analyse the data.

Results: The students exposed to the collaborative learning intervention outperformed those who were taught reading comprehension using the traditional expository methods in the reading proficiency test. Moreover, students exposed to the intervention had less reading anxiety, demonstrated more reading interest, and increased reading autonomy.

Unique contributions to knowledge: The study provides empirical evidence on the effectiveness of the collaborative instructional strategy in enhancing reading proficiency, reducing anxiety, boosting reading interest, and fostering reading autonomy among Nigerian secondary school students. This research contributes to language education knowledge, particularly in the contexts of large classes and limited resources.

Recommendations and conclusions: It is recommended that language teacher trainers should include a collaborative strategy, particularly for large classes. Teachers should embrace innovative evidence-based instructional approaches.

Keywords: comprehension, cooperative learning, jigsaw, reading anxiety, reading autonomy, reading interest, reading proficiency

Introduction

The ability to comprehend and interpret printed or electronic text accurately is referred to as reading proficiency or competence, which also includes the ability to analyse and evaluate the text (National Assessment of Educational Progress, 2019). Reading is critical for survival in Nigeria and in every society. Unfortunately, the reading culture as well as reading proficiency in Nigeria is poor (Okeke, 2019; Oluwatoyin & Adebayo, 2021). Poor reading proficiency can truncate academic ambitions of students and ultimately result in economic and political underdevelopment (Mahdavi, & Tensfeldt, 2013). Students with poor reading skills perform poorly, not only in English Language, but also in other content subjects (Timothy, et al., 2010). With large class sizes and the paucity of reading materials in many schools, students' reading proficiency, reading interest, and autonomy would suffer and reading anxiety would increase. Therefore, it is necessary to explore instructional strategies that can mitigate the limitations of large class sizes and limited access to reading materials that many students in public schools experience. One of such strategies is collective learning (henceforth jigsaw).

Students' academic success, according to Clarke et al. (2013), is dependent on their ability to understand, analyse, and apply the information they gathered while reading. Reading is important not only for employment but also for everyday activities (Hoeh, 2015; Mahdavi, & Tensfeldt, 2013). Poor reading skills could impede learning and success in life (Hoeh, 2015). Therefore, reading proficiency is a critical life skill in Nigeria and globally.

However, despite efforts to improve the education sector, the poor reading culture and reading skills of Nigerian students remain a major challenge (Okeke, 2019; Oluwatoyin & Adebayo, 2021). Research shows that most students struggle with basic reading skills such as decoding, comprehension, and fluency (Adeniyi and Oyesomi, 2018). Such reading deficiencies have adverse consequences on students' academic performance (Ogunkunle & Aremu, 2019; Igbinedion, et al., 2019) Thus, a report by the National Bureau of Statistics (2019) revealed that only 35.9% of Nigerian students who sat for the WASSCE in 2018 obtained credit passes in at least five subjects, including English and Mathematics. Particularly, the poor reading skills of Nigerian students is evident in the poor performance of students in the comprehension section of the West African Senior School Certificate Examination (WASSCE) (Okebukola & Jegede, 2018; West African Examination Council, 2021).

Another factor that is important to reading and learning generally is affect. Affect is defined as the experience of emotions or feelings (Keltner & Gross, 1999). It can be positive or negative and can range from mild to intense (Davidson, 2003). It can influence a person's behaviour, mood, and overall well-being (Cacioppo & Berntson, 1994). Affective factors such as motivation, interest, and anxiety have been found to have a significant impact on reading performance with negative emotions declining reading performance while positive emotions enhancing performance (Kendeou et al., 2015, Tong et al., 2016). Therefore, positive emotions may promote a more engaged and motivated reading experience, leading to better comprehension.

However, the relationship between affect and reading performance is not always straightforward. A study by Wang et al. (2023) found that while positive emotions were associated with better reading fluency, they did not significantly impact reading comprehension. Moreover, a recent

study by Schleider et al. (2021) suggests that individual differences in emotion regulation skills may moderate the influence of affect on reading performance.

Interventions have been suggested to improve the poor reading culture and reading skills of Nigerian students. Fajemidagba and Aina (2021), for instance, proposed more funding for the education sector so that schools can increase their library holdings. Other interventions suggested include the use of electronic devices, audio-visual aids, and instructional materials (Aderibigbe & Okunlola, 2019; Ojo & Ogundipe, 2020). Unfortunately, since such suggestions depend on the government to implement, students continue to perform below expectations in reading comprehension as is consistently reported in the West Africa Examination Council (WAEC) Chief Examiners' Reports (WAEC, 2021).

The problem of poor reading culture and poor comprehension is compounded by the large class size characteristic of Nigerian public secondary schools (Anyanwu, 2020). This is further complicated by limited access to reading materials in Nigerian schools (Adigun et al, 2021). Teaching reading conventionally in a large class with fewer students having access to reading materials could be a herculean task. Such a class is likely to manifest the problem of weak reading skills, along with student anxiety, low reading interest, and poor learner autonomy. Therefore, an innovative strategy such as the jigsaw grouping strategy that can work with large classes even with a paucity of reading materials is worth investigating.

Jigsaw and reading proficiency

The jigsaw is a collaborative learning approach enhancing reading skills by dividing students into small groups with specific tasks (Aronson et al., 1978, Qiao & Jin, 2010) showing superior results compared to traditional teaching methods in multiple studies. For example, Li and Li (2021) observed significant reading comprehension improvement in Chinese EFL students, while Huang and Wang (2021) found higher scores and motivation in Taiwanese EFL students using the jigsaw method. Feng et al. (2020) and Yang and Wang (2017) also demonstrated increased reading proficiency in Chinese students using this approach.

In contrast, a study by Kim and Lee (2017) examined the impact of jigsaw on the reading comprehension of Korean college students. The study involved a pre-test and post-test design with a treatment group and a control group. The results indicated that there was no significant difference in reading comprehension scores between the treatment group and the control group. Few Nigerian studies have explored the effect of the jigsaw strategy on reading proficiency. This study seeks to bridge that gap.

Jigsaw and Reading Interest

Studies among Chinese students (Liu et al., 2019; Wu et al., 2018; Yang et al., 2019) seem to show that the jigsaw strategy increases students' engagement with the reading material and motivates them to continue reading. Moreover, the strategy engenders students' interest in reading as well as metacognitive awareness (Wang et al., 2020), critical thinking skills (Zhang et al., 2021). Although these studies were conducted outside Nigeria, they are corroborated by a Nigerian study (Chukwunonso, 2021).

Jigsaw and Reading Anxiety

Reading anxiety is a common issue among students that can lead to poor academic performance and low self-esteem. One possible solution to reduce reading anxiety is by using a learning strategy which is cooperative, collaborative, communal, and engaging. Several studies have investigated

the effects of the jigsaw learning strategy on reading anxiety in various educational contexts, such as language learning, content-based instruction, and literacy instruction (Cai & Zhu, 2018; Kuo & Wu, 2019). The studies as well as studies by Yao et al. (2021) and Jiang et al (2017) showed that the jigsaw group significantly lower reading anxiety and higher participation rates than the control group, suggesting that the jigsaw approach can create a positive learning environment that reduces students' fear and stress.

The underlying mechanisms of the jigsaw strategy that may contribute to reducing reading anxiety have been investigated. The effectiveness of the strategy has been attributed to a reduction in cognitive and affective aspects of anxiety (Chai & Lee, 2020); boosting confidence and a sense of belonging in the students (Chan et al., 2016); group cohesion (Nguyen & Nguyen, 2019) and fostering a supportive and collaborative learning environment (Kim, et al., 2021).

Jigsaw and Reading Autonomy

Reading autonomy is the ability of a learner to read independently and make decisions about their reading materials and strategies. It is an essential aspect of learning, particularly in the context of language learning, where students need to develop their reading skills to understand the language better. One of the strategies that have proved effective in enhancing reading autonomy is the jigsaw strategy (Tavakoli & Khajavy, 2017; Lee & Choi, 2018; Zhang & Zhang, 2021; and Xie & Li, 2022). The authors attributed the success of the jigsaw strategy to its ability to encourage students to take ownership of their learning and to develop critical thinking skills.

In view of the paucity of studies in Nigeria on the jigsaw strategy, especially as the reading culture in Nigeria is rather poor and many students are deficient in reading skills, the study sought to investigate whether an active learning strategy such as the jigsaw strategy could make a significant but positive difference in students reading proficiency, reading interest, and reading autonomy, while reducing reading anxiety.

Hypotheses

To guide the study, three null hypotheses were stated thus:

1. The jigsaw strategy does not have a statistically significant effect on the reading proficiency of secondary school students.
2. The jigsaw strategy does not have a statistically significant effect on the reading anxiety of secondary school students.
3. The jigsaw strategy does not have a statistically significant effect on the reading interest of secondary school students.

Methods

The study design is the pre-test-post-test quasi-experimental study. The area of the study is the Calabar education zone in Cross River State, Nigeria. There are seven local government areas in the zone. For the sake of homogeneity, two non-randomised intact classes of 192 senior secondary school students were purposively selected on the following criteria:

1. Public day schools that are at least ten years old, and are located at least 10 kilometres apart

(to avoid interactions between students from the control and experimental groups)

2. Schools with at least four streams of about 30 students in each stream.

3. Schools with English Language teachers that possess at least a degree in English Language education with a minimum of five years of teaching experience.

Two rationales informed the use of intact classes. Firstly, the schools were chosen for logistical feasibility as it would have been difficult to reorganize students across classrooms or schools for experimental purposes due to administrative constraints, ethical considerations, and disruptions to the learning process. Moreover, using intact classes minimised the guinea pig effect, that is, the over-sensitisation of the students as subjects of an experiment.

The study was divided into three phases. The first phase was the pre-intervention phase, while the second phase was the intervention phase. The third phase was the post-intervention phase.

Pre-intervention Phase: In this phase, the researchers surveyed schools, using records from the State Post Primary Education Board in addition to visits to preselected schools. In this phase, the researchers visited the principals of the two schools to seek written permission to use their schools for the study. A teacher of English Language from the selected School A after they had been briefed about the study and with the permission of the school principal, agreed to participate in a two-day training workshop on the application of the Jigsaw Group Learning Strategy.

Ethical consideration: The teachers signed informed consent to participate in the study. For the participating students, apart from the written permission from the school principals, written consents were received from their parents. Each of the participating students then signed an assent form. The corresponding author's Faculty Ethical Review Board provided written approval that the study design would not breach the rights of the participants.

In Phase Two, the researchers administered a pre-test including

(1) Affects Rating Scale (ARS); and

(2) Reading Proficiency Test (RPT)

Affects Rating Scale (ARS)

The Affects Rating Scale (ARS) had Cronbach alpha reliability indices which ranged from 0.73 to 0.83. It comprised thirty questions on a four-point scale (strongly agree, agree, disagree and strongly disagree) which was constructed by the researchers. Each of the affect variables was assigned ten questions. The scale was meant to elicit information on students' anxiety, reading interest and autonomy. The data gathered were arranged in the order of magnitude and the middle score was picked. All the students that scored below the midpoint on any of the affect variables were considered to have a low level of the observed variable, while those above the middle score were considered to have a high level. But those in the midpoint were considered as having an intermediate level of the variable.

The Reading Proficiency Test

The proficiency test comprised 50 multiple choice test items, covering questions on reading comprehension, cloze, antonyms, synonyms, and idioms. The instrument was found reliable because the KR-24 reliability coefficient (r) index was 0.79, which is above the minimally recommended value. The researchers mounted a two-day workshop on the Jigsaw Learning Strategy. An instructional package including detailed lesson plans covering four weeks of three lessons each, making a total of 12 lessons was prepared by the authors and used in the training. The teachers were to use the lesson plans for class instructions for the duration of the study.

A key activity of the pre-intervention phase was the administration of the pre-tests to students in both the experimental and the control groups. Also, in this phase, two English language teachers teaching Senior Secondary II in the Experimental school were trained for two days to acquaint them with the jigsaw learning strategy. Teachers of School B (Control) were neither invited to the workshop nor given the instructional package.

Intervention Phase: In this phase, School A class teachers taught their intact class students in the experimental group for 4 weeks. The teaching was guided by a well-articulated lesson plan. Teachers in group B taught using an expository learning strategy since they received no training on the jigsaw strategy. The researchers visited the school regularly to observe how the strategy was implemented and to discuss with the teachers any challenges or needs. The jigsaw strategy was implemented in nine steps:

1. A long passage was selected and divided into sections. Each section was photocopied and made into 25 copies so that each group would have five copies, one for each member. This was part of the instructional package prepared by the researchers. Open-ended questions for the section were clearly written with clear guidelines.

2. The class was divided into heterogenous groups of five members each.

3. Specific sections of the reading passage were assigned to each group to become experts.

4. In each group, each member of the group was assigned the same section to read. They were encouraged to annotate the text and write their responses to the questions.

5. Each individual member reads independently for 3 to 5 minutes.

6. After individual reading, at a cue by the teacher, students with similar sections would assemble together at a predesignated section of the class or even outside the class to discuss their tasks.

7. At a cue from the teacher, the students would get back to their expert groups to discuss their sections and answers.

8. At a cue from the teacher, all the groups would return to the whole class formation where group leaders share their group answers with the entire class.
9. The teacher debriefed the class by asking them to discuss what they learned, the challenges they faced, and so on.

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The Post-intervention phase- This phase was one week. Here the participating teachers administered the post-test. The post-test was made up of the same items in the pre-test though differently arranged. Results of both the pre-test and post-test were then compared for analysis.

Results

To guide data analysis, four null hypotheses were stated and tested.

Hypothesis one: The jigsaw strategy does not have a statistically significant effect on the reading proficiency of secondary school students.

The independent variable in this hypothesis is the jigsaw learning strategy while the dependent variable is the post-test score on reading proficiency. To test this hypothesis, analysis of covariance (ANCOVA) was used and the pre-test score as a covariate and the result is presented in Table 1.

From Table 1, the mean of those exposed to the jigsaw learning strategy (X=31.44) is greater than the mean value (X=18.11) of those exposed to the traditional teaching method. This implies that students who are taught with jigsaw learning strategy performed better than their counterparts in the control group (students who are not taught with the strategy) in terms of their reading proficiency. When these means were further compared using Analysis of Covariance (ANCOVA) with the pre-test as a covariate, the result showed the F-ratio obtained as (F=57.00, p <.05). Since p (.000) is less than .05, this implies that there is a significant difference in secondary school students' reading proficiency when exposed to jigsaw learning strategy. Hence, the null hypothesis is rejected.

Table 1: One-way analysis of covariance results on the effect of jigsaw learning strategy on reading proficiency among students

roups	Mean	Std. Deviation	N
Jigsaw	31.4468	2.91032	147
Control Group	18.1111	1.70856	145
Total	24.9239	7.11481	192

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
orrected Model	4142.834[a]	2	2071.417	397.634	.000
Intercept	532.169	1	532.169	102.156	.000
Pre-test	54.428	1	54.428	10.448	.002
Groups	2969.437	1	2969.437	570.020	.000
Error	463.633	89	5.209		
Total	61757.000	92			
Corrected Total	4606.467	91			

R Squared = .899 (Adjusted R Squared = .897)

Hypothesis two: The jigsaw strategy does not have a statistically significant effect on the reading anxiety of secondary school students

To test this hypothesis, the Analysis of Covariance (ANCOVA) was used and the pre-test score as a covariate. The result presented in Table 2 showed that the mean of those exposed to the Jigsaw learning strategy (X=12.0000) is less than the mean value of those exposed to the traditional teaching method (X=19.48). When these means were further compared using the Analysis of Covariance (ANCOVA) with the pre-test as a covariate, the result showed that the F-ratio was obtained (F=4.637, p <.05). Since p (.000) is less than .05, this implies that there is a significant difference in secondary school students' anxiety when exposed to jigsaw learning strategy. Hence, the null hypothesis is rejected.

Table 2: One-way analysis of covariance results on the effect of jigsaw learning strategy on anxiety among students

Groups	Mean	Std. Deviation	N
Jigsaw	12.0000	2.13201	147
Control Group	19.4894	3.30265	145
Total	15.7447	2.87608	192

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	243.881[a]	2	121.940	21.328	.000
Intercept	63.627	1	63.627	11.129	.001
Method	26.514	1	26.514	4.637	.034
Pre Anxiety group	192.886	1	192.886	33.736	.000
Error	508.858	89	5.718		
Total	33134.000	92			
Corrected Total	752.739	91			

1. R Squared = .324 (Adjusted R Squared = .309)

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Hypothesis three: The jigsaw strategy does not have a statistically significant effect on the reading interest of secondary school students.

To test this hypothesis, analysis of covariance (ANCOVA) was used and the pre-test score as a covariate and the result as presented in Table 3 showed that the mean of those exposed to the jigsaw learning strategy (X=18.65) is greater than the mean value (X=10.46) of those exposed to the traditional teaching method. This implies that students who are taught with the jigsaw learning strategy have higher reading interest than their counterparts in the control group

When these means in Table 3 were further compared using Analysis of Covariance (ANCOVA) with the pre-test as a covariate, the result showed the F-ratio obtained as ($F= 5.27$, $p <.05$). Since p (.024) is less than .05, there is a significant difference in secondary school students' reading interest when exposed to jigsaw learning strategy. Hence, the null hypothesis is rejected.

Table 3: One-way analysis of covariance results on the effect of jigsaw learning strategy on reading interest among students

Groups	Mean	l. Deviation	N
Jigsaw	18.6596	2.14035	147
Control Group	10.4667	4.56373	145
Total	14.5628	3.55927	192

Source	Type III Sum of Squares	Df	ean Square	F	Sig.
Corrected Model	79.841[a]	2	39.920	3.311	.041
Intercept	730.599	1	730.599	60.600	.000
Method	63.583	1	63.583	5.274	.024
Pre Reading interest	4.768	1	4.768	.395	.531
Error	1072.985	89	12.056		
Total	26332.000	92			
Corrected Total	1152.826	91			

Squared = .069 (Adjusted R Squared = .048)

Hypothesis four: The jigsaw strategy does not have a statistically significant effect on the reading autonomy of secondary school students.

To test this hypothesis, analysis of covariance (ANCOVA) was used and the pre-test score as a covariate and the result as presented in Table 4 showed that the reading autonomy mean of those exposed to the jigsaw learning strategy (X=17.04) is greater than the mean value (X=10.91) of those exposed to the traditional teaching method. This implies that students who are taught with jigsaw learning strategy are better than their counterparts in the control group (students who are not taught with the strategy) in terms of their level of autonomy. When these means were further compared using Analysis of Covariance (ANCOVA) with the pre-test as a covariate, the result showed the F-ratio obtained as (F= 36.54, p <.05).

Table 4: One-way analysis of covariance results on the effect of jigsaw learning strategy on learner's autonomy among students

Groups	Mean	Std. Deviation	N
Jigsaw	17.0426	3.62334	47
Control Group	10.9111	5.16760	45
Total	13.8043	5.53359	92

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1034.174[a]	2	517.087	26. 263	.000
Intercept	194.121	1	194.121	9. 859	.002
Method	719.469	1	719.469	36. 542	.000
Pre-autonomy	26.588	1	26.588	1. 350	.248
Error	1752.304	89	19.689		
Total	20318.000	92			
Corrected Total	2786.478	91			

. R Squared = .371 (Adjusted R Squared = .357)

Discussion of findings

Hypothesis one which stated that there is no significant effect of jigsaw learning strategy on reading proficiency among secondary school students was rejected. This implies that there is a significant effect of the jigsaw learning strategy on reading proficiency among students. This could be because this learning strategy requires learners to communicate with each other to fill in missing information and to integrate it with other information. Students can easily benefit from each other's knowledge and thus explain strange words that are sometimes misunderstood among students. Moreover, the result could be that when students are anxious or sometimes even afraid to contribute, they are going to miss information that is needed to fully understand the material. The jigsaw allows students to work with one another and develop a sense of being needed. By being involved in the activities, the students focus on listening, speaking, cooperation, reflection, and problem-solving skills which are what is done using the jigsaw method. The finding corroborates earlier studies such as Li and Li's (2021) findings that the jigsaw strategy enhanced the reading comprehension of Chinese EFL students. The finding also coheres with a study by Huang and Wang (2021) that found that the jigsaw strategy improved the reading comprehension and motivation of Taiwanese students. The effectiveness of this strategy could be in the playful aspects of the process that encourage mixed ability grouping, collaboration, and peer-to-peer communication.

The study found that the jigsaw strategy significantly reduced the reading anxiety of participants. The findings cohere with the findings of previous studies such as Cai and Zhu (2018) as well as Kuo and Wu (2019), whose studies showed that in several different contexts, the jigsaw strategy reduced students' reading anxiety. The effect of the jigsaw strategy on reading anxiety may be attributed to the collaborative and cooperative nature of the jigsaw technique, which promotes a supportive and non-threatening learning environment. The jigsaw allows students to gather in smaller groups and interact with their peers on an equal basis. The power differential between the teacher and the learners is diminished in this setting. Thus, anxiety may naturally reduce because of the atmosphere of camaraderie that pervades the jigsaw group.

Regarding the effect of the jigsaw strategy on students' reading interest, the finding agrees with those of Liu et al. (2019) and Zhang et al (2021) who found that the strategy positively impacted the reading interests of Chinese students. A possible explanation could be that the novelty of the strategy as opposed to the testing of comprehension which often characterises comprehension classes in Nigerian schools could have triggered interest in reading.

In addition, in many public schools, sometimes due to economic reasons, many students may not own the prescribed English Language textbook and there may not be enough copies in the school library to go around. The jigsaw strategy allows students to share reading materials. This enables students who otherwise may not have had access to the reading materials to have an opportunity to interact with the text. Such close interaction can engender interest. Besides, the level of interaction with text engendered by the strategy in an atmosphere devoid of teacher dominance could motivate students who hitherto find no pleasure in reading not only to develop an interest in reading but also to engage in independent reading.

The study's finding that the jigsaw strategy enhances reading autonomy tends to align with previous findings (Zhang & Zhang, 2021; Xie & Li, 2022). By working together to synthesize information and present it to their peers, students can develop a deeper understanding of the

material and build the skills necessary for independent reading and learning. Additionally, the social aspect of jigsaw learning can help to build confidence and motivation among students, as they can support and learn from one another in a positive and collaborative environment.

Conclusion and recommendations

From the findings of this study, it is evident that the jigsaw strategy positively influences secondary school students' reading proficiency, reading interest, and autonomy, while mitigating students' reading anxiety. Therefore, with English as a second language in Nigeria, it is imperative that students have a strong facility in its use. This demands that students acquire proficiency in reading too if they must advance academically, socially, politically and economically.

Therefore, it is recommended that language teacher trainers should incorporate the jigsaw strategy in their language training menu. This is especially important for large class sizes. In this regard the Ministry of Education should organise workshops for teachers and expose them to the jigsaw and other innovative strategies. Teachers should be open to innovative instructional strategies such as the jigsaw and deploy them in their classes rather than cling rigidly to the lecture and expository methods that are generally favoured. In view of the importance of affect variables

Limitations

The study was carried out among students in an English as a second language (ESL) situation. Therefore, the findings may not be generalised to learners in other language situations. In addition, the students used in the study live in an urban environment; therefore, it is uncertain whether the findings could apply to students in rural schools.

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