

Need Assessments of Learning Model for Anemia Prevention Among Vocational High School Students

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ABSTRACT

Background: The sustainable development goals (SDGs) provide an integrated framework of targets and indicators, including the elimination of stunting. The nutritional status of adolescent girls is a strong determinant of the health, low birth weight, and stunting of their future offspring. The health problems for adolescents or students include anemia. If the incidence of anemia in students is not addressed immediately, it will have an impact in the future, namely on students experiencing anemia when they're pregnant in future. So, It is necessary to develop a learning model for anemia prevention for students. **Aims:** This research aims to analyze the students needed for the anemia prevention learning model. **Method:** This article used a qualitative descriptive method with a case study approach. The informants are 7 students, 1 health center teacher, and 1 vice principal. Data collection was conducted by in-depth interviews and FGD. Data were analyzed using content analysis methods. **Result:** The practice of taking iron supplements for Students is low, Eating patterns are only 2 times a day and they have difficulty eating, the informants didn't have the habit of physical activity at home and have unhealthy sleeping habits. Students need educational content about anemia and healthy eating patterns. Students like the P5 (Pancasila Student Profile Strengthening Project) Method. And the communicator is a teacher or other person who understands about anemia. **Conclusion:** Student behavior related to anemia prevention is not good. It is necessary to educate students about the prevention of anemia. The development of the learning model taken is the P5 Module with the theme of Anemia Prevention.

Keyword: anemia prevention, health promotion, Learning Model, P5 Module

INTRODUCTION

The sustainable development goals (SDGs) provide an integrated framework of targets and indicators, including the elimination of stunting, to support better development planning. Indonesia faces a significant challenge as it ranks fourth globally in terms of stunting prevalence, exacerbated by disparities across regions, gender, and socioeconomic status, further compounded by the ongoing COVID-19 pandemic. Understanding the interlinkages between the SDGs could direct this study to focus specifically on tackling a specific issue, including stunting (Komarulzaman *et al.*, 2023).

Stunting is a global issue that urgently needs to be resolved because it decreases the quality of people in the world, globally, 144 million people are stunted in 2020 (Tyler Vaivada, Nadia

Akseer, Selai Akseer, Ahalya Somaskandan, Marianne Stefopoulos, 2020). One in four children under the age of 5 is stunted (Haileyesus Ejigu, 2023). Stunting is an urgent global issue to be resolved as it impacts the quality of human resources in the future. (Fadmi *et al.*, 2023) Stunting is one of the problems of malnutrition. Child malnutrition is a global problem with few concerns over survival (World Health Organization, 2014).

Stunting in children has immediate and long-term impacts (Soliman *et al.*, 2021). According to estimates by UNICEF, WHO, and the World Bank, more than half of stunted children <5 years are reported to live in Asia (Haileyesus Ejigu, 2023). Indonesia is ranked fifth in the country with the highest stunting burden in the world (Titaley *et al.*, 2019). Based on the results of SSGI 2022, the prevalence of stunting

in Indonesia reached 21.6%, above the WHO target of 20%. In addition, the Indonesian government targets the stunting rate to be 14% by 2024 (Kementerian Kesehatan RI, 2023).

A large and growing body of literature has investigated various factors related to stunting. For instance, the malnutrition that contributes to stunting is not only related to a lack of family food security (SDG 2) but also the effects of poverty (SDG 1), poor health services (SDG 3), maternal awareness (SDG 4), and access to clean water and sanitation (SDG 6) (Agustina, Sartono and Notodiputro, 2021). Stunting is caused by quite complex, including the health characteristics of children under five, sociodemographic factors, and environmental factors (Oginawati *et al.*, 2023). Stunting reduction requires a strong commitment and political will from the government and an integrated (Atmarita *et al.*, 2015). One of the Government of Indonesia's top priorities is to reduce stunting with a multi-sectoral and coordinated approach at the national, regional, and community levels (Elvina Karyadi *et al.*, 2021). Child stunting prevention includes specific and sensitive nutrition intervention programs (Margatoh and Huriah, 2021). One of the nutrition-sensitive intervention programs is about adolescent health.

The nutritional status of adolescents is very important and becomes the entry point for improving the health of women and children. The nutrition and health of adolescent girls and pre-pregnant women require early preparation to prevent the birth of stunted children. One of the ways to prevent the birth of stunted children is to fulfill various micronutrients for adolescents (Renyot, Dary and Nugroho, 2023). The health problems for adolescents include anemia.

Anemia is characterized by a reduction in Hb concentration, RBC count, or packed-cell volume, and the subsequent functionality impairment of meeting oxygen demand in tissues (Shubham *et al.*, 2020). Anemia and malnutrition continue to be global health problems, especially among females in developing countries, including Indonesia. Anemia burden counts for 1.6 billion people or 25% of the population worldwide (Agustina *et al.*, 2021).

Meanwhile, 15% of adolescent girls worldwide suffer from anemia, with 6% in developed and 27% in developing countries. The prevalence of anemia according to Riskesdas, 2013 was 37.01% and in 2018 the prevalence of anemia increased to 48.09%. The prevalence of anemia in adolescents aged 15-24 years is 18.4%. Data from the Central Java Provincial Health Office in 2016 stated that the prevalence of iron nutrition anemia in adolescents was 22.8%. Anemia is a condition where hemoglobin and erythrocyte levels in the body are below normal (Fitriyani *et al.*, 2022).

The provision of blood supplement tablets (TTD) to students is one of the indicators of success in overcoming anemia. According to the 2018 Riskesdas data, 80.9% of adolescent girls received blood tablets at school, but only 1.4% of adolescent girls consumed blood tablets.

One of the groups prone to anemia is adolescent girls. This group has a ten times greater risk of developing anemia than adolescent boys for several reasons. First, adolescent girls experience a menstrual cycle every month. Secondly, the majority of adolescent girls have the wrong eating habits. This happens because adolescent girls tend to look slim to maintain their appearance. So that adolescent girls encourage themselves to diet and eat less. But the diet is not a balanced diet according to the body's needs. As a result, there is a lack of important substances such as iron. The impact for adolescents suffering from anemia is a decrease in learning concentration, a decrease in physical fitness, and growth disorders so that height and weight do not reach normal. In adolescent girls, if anemia is not handled properly, it can have an impact on adulthood later. The threats that occur are an increase in maternal mortality, babies born prematurely, low birth weight (LBW), and also stunting.

If the incidence of anemia in adolescent girls or students is not addressed immediately, it will have an impact in the future, namely students experiencing anemia when pregnant. The high prevalence of iron deficiency anemia among students has a major contribution to maternal mortality, premature births, low birth weight babies, and stunting. This will certainly have an impact on increasing the prevalence of stunting in

Indonesia. Therefore, it is necessary to develop a learning model for anemia prevention for students.

METHODS

Research Design

This research uses qualitative research methods with a case study approach. Data collection was carried out directly on respondents so that a description of the actual situation of the respondents was obtained. Data were collected through in-depth interviews and focus group discussions.

Ethical considerations

All informants in the study had signed a written informed consent form before any study-related procedure was performed. This research has passed the ethical review by the Health Research Ethics Commission, Faculty of Public Health, Diponegoro University with letter number: 513/EA/KEPK-FKM/2023.

Informants

The number of main informants was 7 people from each department in the vocational high school, student council organizer, and PMR using a purposive sampling technique. The inclusion criteria were tenth grade, had menstruated, and were willing to be informants. The exclusion criteria are those who have never received material about anemia specifically. Additional informants were 1 vice principal and 1 UKS coach. Credibility in this study uses source triangulation by comparing information from main informants and additional informants, as well as technical triangulation by conducting observations and documentation studies (Dewi Rokhmah, Iken Nafikadini, 2019).

Research Procedure

This research was conducted at "X" Vocational High School in Semarang, Central Java. The first stage was a focus group discussion followed by an in-depth interview. Focus group discussions and in-depth Interviews were conducted with 7 female students. The place used for focus group discussion and in-depth interviews in the school lobby so that it was far from other friends so that informants felt comfortable in telling stories.

Interviews were conducted after the informants gave their consent to become research informants. gives a standard time between 1-2 hours, based

on Utarini (Utarini, 2007). In this research, the FGD was conducted for 1 hour. The time needed for in-depth interviews with each informant took about 1-1.5 hours. Conversations during in-depth interviews were audio-recorded and each informant was given Rp.50,000 in exchange for the time already used for the interview. After all the main informants had conducted focus group discussions and in-depth interviews, the next step was to interview triangulation informants, namely the UKS coach and the vice principal.

Data Analysis

Recorded interview data was transcribed and coded and themes related to ideas about the condition or behavior of students related to health and analysis of learning media needs. Data analysis using content analysis

RESULT DAN DISCUSSION

Informants Characteristic

Informants consisted of 7 students, 1 health center teacher, and 1 vice principal. Students aged between 16-17 years old. The remaining demographic characteristics of the participants are shown in Tables 1 and 2.

Table 1. Demographic characteristics of main informants

Demographic characteristic	n (%)
Gender	
Female	7 (100)
Age	
16	3 (42)
17	4 (58)
Grade	
High school	7 (100)
Total	7 (100)

Table 2. Demographic characteristics of additional informants

Demographic characteristic	n (%)
Gender	
Female	1 (50)
Male	1 (50)
Age	
30-40	1 (50)
41-50	1 (50)
Institution	
High school	2 (100)
Job	
Vice Principal	1 (50)
Health centre teacher	1 (50)
Total	2 (100)

A. Analysis of the Condition of Students
a. Practice of Taking Iron Supplement

"...Not all, not all, just some. From school I get 1 strip for 1 month. but I never take it all, because I don't take it regularly. e... because it doesn't taste good"
(KK, Student)

The practice of taking iron supplements among students is still lacking. Most of the informants only took iron supplements once at school which were distributed by the health center. A small proportion of students took iron supplements during menstruation only and when they had low blood pressure. Students claimed that iron supplements distributed at school had a fishy taste. So most of them did not want to consume it. Meanwhile, according to students, iron supplements obtained from pharmacies such as Sangobion had better taste than those obtained from schools.

Informants mentioned that the barriers they had experienced when taking iron supplements were feeling nauseous, headache, bitterness, and fishy smell. Research studies have shown that iron deficiency is the most common micro-nutrient deficiency associated with anemia, while folate deficiency and Vitamin B12 deficiency are ranked as the second and third most prevalent micronutrient deficiencies associated with anemia (Ramachandran and Kalaivani, 2018).

Previous Research showed that Most respondents had low knowledge about anemia, attitudes, and intentions regarding iron supplements. This can happen due to various factors, such as lack of education/counseling, different distribution times for iron supplements at each school, and the method of implementing the program in schools that is not optimal (Silitonga *et al.*, 2023).

Iron is needed for the production of hemoglobin, which is an essential ingredient in red blood cells. Hemoglobin is very important, as it

carries oxygen from the lungs to the rest of the body. If a person doesn't have enough iron, they can develop anemia, which means they aren't making enough red blood cells to carry oxygen around their body. The effects are breathless, tired, and a lack of energy, the skin may become pale and may have palpitations (noticeable heartbeats) (The Blood Safety and Conservation Team, 2015).

Iron supplementation involves the oral administration of pharmaceutical iron compounds. Supplementation of iron can be practiced when immediate action is required for increasing the level of iron in the human body as orally administered haem iron easily enters into the bloodstream (Shubham *et al.*, 2020). Many factors influence adherence to taking iron supplements including knowledge, attitude, motivation, parental support, and teacher support. Based on research conducted by Nuradhiani, the most dominant determinant of adherence to taking iron supplements in Students is teacher support Good teacher support significantly increased their adherence to taking iron supplements 4.7 times greater than those who received less support from teachers (Nuradhiani, Briawan and Dwiriani, 2017).

b. Eating Patterns

"...I like junk food like fried chicken and greasy food, not often, rarely, at most once or twice a week. or once in a while, yes, it's okay, but if it's too much, it can cause inflammation, but when you want it, it's okay" (DY, Student).

All informants thought that it was okay to eat instant food as long as it was not in excessive portions (reasonable), instant food tasted good, and a substitute when hungry. despite knowing the dangers of instant food because it contains preservatives.

Students' nutritional needs need to be considered because in adolescence there is rapid growth and development. Unhealthy eating

habits will affect students' nutrition. Unhealthy foods such as fast food are consumed by students. At a time when everything is modern like now, teenagers want everything to be fast, including in choosing food. Fast food is also known to the public as junk food. Junk food is defined as food waste or food that does not have nutrients for the body. Eating junk food is not only in vain but can also damage health. (Pamelia, 2018) Therefore, students must adopt a healthy diet to build their bodies. The habit of consuming unhealthy food since adolescence will have a negative impact in the future (Hartini, 2020).

Nutritional deficiency anemia mainly results from a lack of iron, vitamin B12 & and a low vitamin C intake. Prevention can be done by consuming iron-rich food (such as red meat, poultry, and seafood), beans, dark green leafy vegetables, dried fruits, peas, and Food containing vitamin C that enhances iron absorption these are broccoli, tomatoes, oranges, lemon (Bhadra and Deb, 2020).

c. Exercise Habits

"Sports once a week in sports lessons, if the habit of sports outside school does not exist yet." (DA, Student).

All informants did sports at school once a week during sports lessons. On average, informants did not have the habit of exercising at home because they were lazy and preferred to sleep. Despite this, all of them thought that exercise was important for health and the immune system. A small proportion of informants have exercise habits at home, such as stretching and cycling.

To achieve good health standards, it is necessary to have a process of managing the surrounding environment and daily activities that are reflected in a healthy lifestyle. A healthy lifestyle is a community lifestyle that upholds health aspects such as managing cleanliness and environmental health, maintaining physical and psychological fitness, and providing adequate nutrition, to

achieve good health standards. Physical activity also plays an important role in preventing anemia.

d. Sleep Habits

"...I honestly sleep irregularly, sometimes at half past 10, sometimes at 10 o'clock, if I'm really tired, at 8 o'clock I'm already asleep, I immediately go to bed and wake up at dawn. Sometimes at 10 - set 2 just sleep. How yes, usually a lot of thoughts, the body is tired, the eyes are sleepy but the eyes are still fresh. Thinking a lot, school burden, home burden, joining student council, PMR, journalist, etc." (DA, Student)

On average, informants have unhealthy sleeping habits (7 hours/day), and some even sleep late into the early hours of the morning due to difficulty falling asleep and not fulfilling the recommended sleep time (8-9 hours). The reasons are doing school assignments, and playing on cellphones so that they forget to sleep.

Sleep is a basic human need that absolutely must be fulfilled by everyone. Everyone needs enough sleep to be able to carry out activities optimally in the future. Therefore, every human being must get maximum rest results to get good quality sleep. Most people, especially students who are the target audience, still ignore healthy sleep patterns and use sleeping hours that are not to their needs to fulfill their sleep quality. This is caused by external disturbances such as late-night work, urban lifestyle, using gadgets before bedtime, and lack of understanding of the impact of staying up too late (Putra *et al.*, 2017).

B. Analysis of Learning Method

a. Content Analysis

Based on the results of interviews with students related to health education content needs, some data were obtained. The categories of material needed by students regarding health in general are:

"e..material on how to manage good sleep time. Then, e.. what is it, for health such as anemia and drugs? I think mental health is also important. But the way the material is given is lighter, for example, given directions on how to relieve stress properly so as not to hurt yourself or self-harm" (DA, Student)

"...We need to explain a healthy lifestyle, because nowadays we have a lot of tasks, so we eat late and it's not healthy. The causes of irregular eating are sometimes late eating because of assignments, and lazy eating because they are not in the mood. I also don't like the menu, the food is also like that" (RA, Student)

"...Yes about junk food, soda drinks, diet" (DY, Student)

"...Maintaining food consumption, like being advised on good foods that should be consumed. because many people close their eyes about unhealthy foods" (TR, Student)

Based on the data above, it can be concluded that the material needed by students related to health varies, including sleep patterns or how to manage good sleep, eating patterns including eating healthy foods to the dangers or avoiding junk food. In addition, some students argue that material regarding mental health such as managing stress is also needed by students.

Based on the results of the interviews, the following are the categories of material needed by students regarding health, especially about anemia, which are:

"The definition of anemia, foods and drinks that should not be consumed and those that can be consumed, and those that support the prevention of anemia, and how we can avoid getting anemia" (RA, Student)

"...Need materials about anemia prevention, its causes, that's all" (MY, Student)

"...foods and drinks that should be eaten or not eaten during menstruation" (FD, Student)

"...symptoms of anemia and how to treat" (DY, Student)

"Habituation to take blood supplement tablets and eat healthy food" (TR, Student)

"...a good diet, or some kind of explanation about blood supplement tablets" (DA, Student)

Based on the data above, it can be concluded that the material about anemia needed by Students includes material about foods that can prevent anemia and can cause anemia, a good diet, taking blood supplement tablets, causes, and symptoms of anemia, and how to overcome anemia.

Based on the results of interviews with additional informants, no socialization at school focuses on preventing anemia and preventing stunting. The following are the results of interviews with additional informants:

"...In our curriculum, we have not included education about stunting, we have collaborated with the puskesmas to focus more on children's current health, not thinking about the long term. Even the blood supplement tablets are to maintain children's health at this time. So that they don't get anemia, to prevent them from getting weak during their period, and so on, like that. There has not been any socialization to think in the long term. There has also never been any socialization of stunting at the puskesmas. If there are any special activities to prevent stunting, there are none from the puskesmas, the most that we can participate in is when we want to give blood supplement tablets..." (AE, Vice Principal)

Based on these answers, the provision of education on the prevention of anemia and stunting has not been a special activity. Only a little information interlude when giving blood supplement tablets.

Previous research showed that Interventions around nutrition education have a positive impact on knowledge, attitude, and practice among school-age children in Ghana (Antwi *et al.*, 2020). Research conducted on adolescent girls in Jordan shows that nutrition education can improve knowledge, attitude, and practice toward anemia (Abu-Baker, Eyadat and Khamaiseh, 2021).

b. Learning Method Analysis

The results of the analysis of interviews in the field on the needs of educational / learning media development show that students want a good learning resource that combines theory and practice or is project-based and interestingly packaged. So that students also participate actively, not just passively listening to the material.

"...I prefer to practice, but sometimes I need materials because if I practice without materials, I sometimes get confused" (DA, student)

Based on the findings in the field, the relevant stakeholders (vice principal and health center teacher) suggested that a project-based learning media be developed.

Because it aims to be more powerful and more in touch with students. With the aim that students not only know but also realize. The project-based learning module is by creating a P5 module (Pancasila Student Profile Strengthening Project) which is included in the Sustainable Lifestyle theme (It is one of the themes of 8 other themes). The thing that needs to be considered is that the material described in the module is connected to the daily context so that they think far ahead. The material is made as contextual as possible to make it more relatable and easily

accepted by students. The module is a scheme or scenario for 5 days (adjusting the duration of the implementation of P5 in schools) that is equipped with teaching materials. The module also describes the practice/project/simulation that will be carried out by students. The stages of the P5 module are quite long, but if it is implemented it is a good thing and students are also enthusiastic and find it easier to understand the material presented because students not only get theory at the beginning but also practice or do simulations.

"...Suitable learning model? For our children, yes, the character ... I see from the character of the child that they prefer learning that is not monotonous in the classroom it seems. Maybe with project-based then activities in the field, children are invited out to be shown directly with a context that is by the theory, and they are more interested. This is evident from the enthusiasm of the children when we have P5 project activities" (AE, Vice Principal)

Students in this school like learning models that focus more on practice, so that students can more easily understand the context.

When the P5 program was implemented at school, students were very enthusiastic about it. For this reason, the suggestion from the school is that learning materials regarding anemia prevention or stunting prevention can be in the form of projects tailored to the P5 project with the theme of Sustainable Lifestyle.

Based on the results of interviews, informants or young women are also enthusiastic about participating in P5 lessons.

"P5 enthusiastically yes, because there are no other lessons besides this, and it teaches us to be creative and critical. Lessons are not only in the classroom but can be outdoors" (RA, Student)

Students mentioned that in P5 learning what they need is to be given media that is interesting and not boring.

"Balance between material and field learning. The material can be through video or practice. If it's a video, it's an animated video. The maximum duration is 15-20 minutes. I like inspirational movies, if the duration is long, it's okay as long as it's not monotonous." (RA, Student)

"Yes, it is more suitable through practice than only through socialization, provided that the socialization method is only reading. It would be better if there was more interaction with the audience in the socialization, for example giving questions to the audience in a fun way" (DA, Student)

Some informants mentioned that they preferred the material to be delivered through audiovisual media such as animated videos.

"...Yes, it might be different, what if the video is the one that explains it, maybe it can take a long time, to explain it from start to finish, but indeed if what is on TikTok is just an outline, the difference between TikTok and YouTube is that the explanation is different, now it can be adjusted, where is it" (FD, Student)

Some informants mentioned that they like short videos like those in the TikTok application where the duration is not too long. Audiovisual media is a moving and dynamic medium that can be seen heard and delivered through electronic aids with the advantages of being easy to understand, more interesting, and involving all the five senses so that audiovisual delivery is more easily understood (Trifitriana, Fadilah and Mulawarman, 2014).

c. Communicator Analysis

Based on the results of in-depth interviews, most informants answered that people who can

provide education about anemia are people who understand anemia.

Even though their background is not a health worker, as long as the person can understand the material, they can still be a presenter.

"...who understands enough about anemia, who master the material... experienced people like doctors, teachers are also suitable. because in my opinion, we don't have to be healthy people to provide health information. the important thing is that we know what anemia is, how to deal with it, like that" (TR, student)

Based on the results of the interviews, if peers get material about anemia and then spread it to other friends, most informants argue that if it is a peer educator who provides the material, they do not agree, because they feel less valued and less listened to, besides that if the information is confidential, they are afraid of leaking it to other friends.

"...The reason is that peer educators are often underestimated and many do not listen" (KK, Student)

"...I don't think peer tutors are suitable, because my friends don't trust me even though I have received training" (MY, Student)

"Maybe if it's friend to friend, like 1 1, it's definitely like "ih you know this, this, and then the other one is telling this, this is the fee, prone to leakage, but not all" (TR, student)

Only a small number of informants thought it was fine if peers provided the materials.

"...Peers, you can. Just ordinary people who have knowledge or experience with anemia. It can be older siblings, parents, and teachers, even small children. The point is, as long as they know the definition, impact, and

prevention of anemia" (DA, Student)

Most informants thought that at school, the teacher was a more respected figure. They think that teachers who deliver material about anemia can also do so. As long as the teacher has been trained or given material about anemia so that they can convey it to students.

"...It is possible, but with the condition that the teacher has experience or knowledge on how to explain and give socialization in case of anemia" (DA, Student)

Based on the interview results, the informant prefers presenters with good public speaking, so that the informant can more easily understand the material.

"...Explaining in a good but cool way, if you listen to it, you won't get sleepy or bored. The public speaking must be good because the way the material is delivered is not good, the listener will be bored and not focused." (DA, Student)

Based on this, the speaker in any background, in delivering the material must be good so that the informant can easily understand the material well.

C. Summary of the Results of the Needs Assessment.

a. The content needed by students are:

- 1) Healthy lifestyle, including sleep patterns, exercise patterns, and mental health
- 2) Stunting prevention
- 3) Anemia prevention
- 4) Definition, causes, and effects of anemia
- 5) Importance of taking blood supplement tablets
- 6) Healthy diet
- 7) Unhealthy diet

b. The learning methods required are:

- 1) Not just theory, but also practice

- 2) Learning methods not only in the classroom but also outside the classroom
- 3) P5 learning methods with interesting activities
- 4) The material is delivered in the form of animated videos with a duration that is not too long/short, a maximum of 3-5 minutes
- 5) Informants also like media such as inspirational films that are not boring.

c. The material providers needed are:

- 1) People who understand the material about anemia, do not necessarily have a health background
- 2) In schools, teachers can be presenters, as long as they have received training or knowledge about anemia.
- 3) Presenters are not peers, because it is feared that they will be less respected and not listen to them.
- 4) Public Speaking of the speaker must be good so that it makes it easier for participants to understand the material presented.

CONCLUSION

The practice of taking iron supplements for Students is low. The average eating pattern of students is only 2 times a day and they have difficulty eating. Besides that, students prefer instant food to healthy food. On average, the informants didn't have the habit of physical activity at home and had unhealthy sleeping habits.

It is necessary to educate students about the prevention of anemia because Students will become future mothers who give birth to a healthy child and are not stunted. Based on these results, the development of the learning model taken is the P5 Module (Pancasila Student Profile Strengthening Project) with the theme of Anemia Prevention. The P5 module is prepared based on the results of the needs analysis and guidelines from the Ministry of Education and Culture. The results of the needs analysis are then applied in the P5 module by adjusting the template or format of the P5 module provisions.

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