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Effects of Artificial Intelligence-Related Social Factors: Ethics and Access on Students' Learning Behavior

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Abstract

The rise of Artificial Intelligence (AI) in education has presented higher education institutions with fresh prospects for enriching the learning experiences for students. But the effectiveness of AI is contingent on several social factors that impact the interaction that students have with AI technologies. Thus, this study explored the effect of the social factors related to Artificial Intelligence, such as Access and Ethics, on students learning behaviour. Access was assessed via accessibility to AI technology, institutional support, adoption of AI, digital equity and inclusive access, and Ethics was assessed via human sensitivity and transparency. The design of the research is quantitative and the respondents of the research are 200 students of the university which are filled in a structured questionnaire. SPSS was used for statistical analysis such as descriptive statistics, Pearson correlation analysis and multiple regression analysis. According to descriptive results, there were positive perceptions for Access (M = 3.2342), Ethics (M = 3.5700) and Learning Behavior (M = 3.9940). The results of Pearson's correlation analysis showed positive correlations between Access and Learning Behavior ($r = .383$, $p < .01$) and Ethics and Learning Behavior ($r = .438$, $p < .01$). Also, regression analysis showed that both Access ($p = .001$, $\beta = .234$) and Ethics ($p = .000$, $\beta = .334$) were significant factors in students' learning behavior. Ethics was the most predictive factor. The study findings suggest that ethical issues, including transparency and human sensitivity, as well as the equal access to AI technologies and institutional support, have a positive impact on students' learning behaviour. The results underline the significance of fostering responsible use of AI and enhancing the availability of AI tools in the context of higher education.

Introduction

Artificial Intelligence has become an important part of higher education because students are increasingly using AI tools for academic writing, assignments, concept clarification, feedback, examination preparation, and problem-solving. However, the effect of AI on students' learning behavior is not only related to the availability of AI tools but also depends on social factors such as ethical awareness and access. Ethics guides students toward responsible, fair, transparent, and academically honest use of AI, while access determines whether students have the digital resources, institutional support, AI literacy, internet facilities, and inclusive opportunities required to use AI effectively. Therefore, the present paper focuses on the effects of Artificial Intelligence-related social factors, particularly ethics and access, on students' learning behavior (Buele *et al.*, 2025; Yusuf *et al.*, 2024; Al-Sowaidi and Clarke, 2025).

This study discussed the role of institutional adoption policies and guidelines for generative Artificial Intelligence in higher education. The study focused on how universities respond to AI integration through policy development, institutional support, governance, and AI literacy initiatives. It explained that students' access to AI is not only based on personal use of digital tools but also depends on institutional readiness and the availability of proper academic guidelines. The paper is relevant to the present study because it shows that institutional support and AI literacy are important access-related factors that can influence students' ability to use AI tools effectively for learning purposes (Jin, 2025).

This research explored the perceptions of generative AI tools in higher education among students and academics at Sultan Qaboos University. The study examined actual use, perceived usefulness, ease of use, challenges, and intention to use AI tools. The findings showed that students' adoption of AI depends on how accessible, useful, and understandable they consider these tools. This paper is important for the present study because it explains that access to AI tools, ease of use, and perceived academic value can influence students' intention to use AI and their learning behavior (Alshamy *et al.*, 2025).

This Research examined the ethical use of generative Artificial Intelligence among Ecuadorian university students. The study focused on affective, cognitive, behavioral, and ethical dimensions of AI use. The findings showed that students' ethical engagement with AI depends on their understanding, attitudes, and responsible behavior toward generative AI tools. The study explained that frequent use of AI does not automatically mean responsible use; rather, students need ethical awareness to use AI in a meaningful academic way. This paper is directly related to the present study because it supports the role of ethical awareness in shaping students' learning behavior in AI-mediated learning environments (Buele *et al.*, 2025).

This research studied generative Artificial Intelligence in higher education by examining whether it is a threat to academic integrity or a source of educational reform. The study focused on academic integrity, ethical concerns, multicultural perspectives, benefits, and risks of AI in higher education. The paper explained that generative AI can support students' learning, but it can also create problems when students use it without ethical limits. This study is important for the present research because it connects ethical AI use with students' academic behavior and highlights the need for responsible use of AI tools in learning activities (Yusuf *et al.*, 2024).

Most existing studies have been conducted in international settings, while students in Pakistan may face different challenges related to ethics and access. Therefore, the present paper is designed to examine the effects of Artificial Intelligence-related social factors, on students' learning behavior.

Significance of the Study

The present study is significant because Artificial Intelligence is becoming an important part of students' academic learning, but its effects on learning behavior depend on ethical awareness and access to AI technology. AI tools can support students in writing, assignments, concept understanding, feedback, examination preparation, decision-making, and problem-solving. However, these benefits can only be achieved when students use AI responsibly and have proper access to internet, digital devices, institutional support, and AI literacy. The findings will be useful for students, teachers, universities, and policymakers. Students may learn responsible AI use, teachers may guide students more effectively, universities may develop AI training and support systems, and policymakers may promote fair and inclusive AI integration in higher education. This study is especially important in the Pakistani higher education context, where students may face challenges such as internet cost, limited AI literacy, language barriers, unequal digital access, and lack of institutional guidelines.

Objectives of the Study

1. To examine the effects of ethical awareness of Artificial Intelligence on students' learning behavior.
2. To assess the effects of access to AI technology on students' learning behavior.
3. To propose recommendations for enhancing the ethical use and equitable access of Artificial Intelligence technologies to improve students' learning behavior in higher education.

Review of Literature

Ethics in Artificial Intelligence

Acosta-Enriquez *et al.* (2024) analyzed college students' attitudes toward the use of ChatGPT in their academic activities. The study focused on students' intention to use ChatGPT, verification of information, responsible use, and academic engagement. The findings showed that students' attitudes toward ChatGPT influence how they use AI tools in academic work. The study also highlighted that responsible use and verification of AI-generated information are important for maintaining academic quality. This paper is useful for the present study because it explains that ethical and responsible use of AI can influence students' academic activities and learning behavior.

Ravšelj *et al.* (2025) examined higher education students' perceptions of ChatGPT and explored their early reactions toward this AI tool. The study focused on students' usage, satisfaction, perceived capabilities, regulation, and ethical concerns. The findings showed that students recognize the usefulness of ChatGPT for academic support, but they also express concerns about regulation, reliability, and ethical use. This study is relevant to the present research because it explains that students' learning behavior is shaped by their access to AI tools, their satisfaction with these tools, and their awareness of ethical issues in academic use.

Hasib and Islam, (2025) explored how university students in Bangladesh engage with ChatGPT for academic support. The study focused on students' academic assistance, ethical concerns, over-reliance, plagiarism, and responsible use of ChatGPT. The findings showed that students use AI tools to receive academic help, but there are concerns about dependency and misuse. This paper is related to the present study because it highlights that students' learning behavior can be improved when AI is used as a support tool, but it can be weakened when students become overly dependent or ignore ethical responsibilities.

Sun *et al.* (2026) reviewed the concept of Friendly AI and human-AI alignment by focusing on the development of AI systems that remain safe, beneficial, fair, controllable, and aligned with human values. The study emphasized human-centered AI, privacy, safety, fairness, explainability, and affective computing as important areas in the development of responsible AI systems. This paper is relevant to the present study because human sensitivity in AI requires educational AI tools to consider students' emotional, social, and ethical needs while supporting their learning behavior.

UNESCO (2021) presented the Recommendation on the Ethics of Artificial Intelligence as a global standard for ethical and responsible AI. The recommendation emphasized human dignity, human rights, fairness, inclusion, transparency, accountability, and prevention of harm in the development and use of AI systems. It explained that AI should be designed and applied in ways that protect individuals and promote social well-being. This document is useful for the present study because it supports the idea that AI tools used in education should be human-centered, inclusive, fair, and sensitive to students' rights and learning needs.

Chaudhry *et al.* (2022) developed a Transparency Index Framework for Artificial Intelligence in education. The study explained that transparency is necessary in educational AI systems because it supports interpretability, accountability, safety, and responsible AI development. The framework was developed by considering the transparency needs of different stakeholders, including

educators, educational technology experts, and AI practitioners. This paper is strongly related to the present study because AI transparency can help students understand AI-generated responses, recognize limitations, and use AI tools more critically in their learning process.

Access to Artificial Intelligence

Bamasoud *et al.* (2025) studied the adoption of generative AI in higher education from the perspectives of students and lecturers in Saudi universities. The study focused on ethical, psychological, and institutional factors that influence generative AI adoption. The findings showed that AI adoption is shaped by ethical concerns, institutional support, readiness, and users' confidence in AI tools. This study is relevant to the present paper because it connects both ethics and access by showing that responsible AI use depends on ethical understanding as well as institutional support for AI adoption in academic settings.

Sun (2025) discussed the use of generative AI in higher education by focusing on institutional support, AI literacy policy, and students' and educators' attitudes toward AI. The study explained that the successful use of generative AI depends on whether educational institutions provide proper guidance, policy support, and literacy-based training. It also emphasized that lack of institutional support may create confusion and unequal use of AI among students. This paper is useful for the present study because it supports the idea that access to AI is not only about having tools but also about institutional guidance and AI literacy support for students.

Hadar-Shoval *et al.* (2025) examined whether generative AI bridges or widens the gap for diverse student populations. The study focused on digital divide, diverse learners, inclusive access, and student support in AI-mediated learning. The paper explained that AI tools may provide new learning opportunities, but they may also increase inequality when students do not have equal access, skills, or support. This study is directly related to the present research because it highlights digital equity and inclusive access as important factors that can influence students' participation and learning behavior in AI-supported education.

Al-Sowaidi and Clarke (2025) examined the AI-digital divide in Yemeni and South African higher education through an inclusive policy-oriented approach. The study focused on digital infrastructure, inclusive policy, equity, access, and institutional support in AI-supported higher education. The paper explained that unequal access to AI tools, internet, training, and digital resources may limit students' participation in AI-mediated learning. This study is important for the present research because it shows that access to AI technology is a social equity issue that can influence students' learning opportunities and learning behavior.

Research Methodology

The cross-sectional survey research design was used in the present study. This design was appropriate since data were gathered at a single time to explore how changes in the students' learning behavior related to the effects of the various factors of AI.

Study Area

The research was carried out in the University of Agriculture, Faisalabad, Pakistan. This region was chosen because University students are increasingly meeting AI tools for academic learning and research activities.

Target Population and Sample Size

The study aimed at the undergraduate and post-graduate students of the University of Agriculture, Faisalabad. The students were chosen as they were relevant to the research on the use of AI and learning behavior. The number of the students proposed for the study was 200.

Sampling Technique
A convenient sampling technique was used to choose the respondents. The research technique was conducted using this method as it made gathering data from students within the University relatively easy.

Data Collection Tool
Structured questionnaire was used to collect data. The questionnaire featured items to capture demographic data, as well as the Likert scale questions on access, ethics and students' learning behavior.

Measurement of Variables
Access, ethics were independent variables. Students learning behavior measured based on problem solving, decision making and critical thinking became the dependent variable.

Data Analysis
Data gathered was coded and analyzed using SPSS Statistics Version 23 to code, enter and analyze the data. Demographic characteristics and study variables were summarized using descriptive statistics, such as frequencies, percentages, means and standard deviations. The relationships between the independent variables (AI Ethics and AI Access) and dependent variable (Learning Behavior) were analyzed using Pearson correlation. Multiple regression was employed to see whether the independent variables as a whole contributed significantly to learning behavior.

Results and Discussion
Socio-economic and demographic characteristics:
The result shows that the majority (77.0%) of the respondents were female, 23.0 % were male. Almost half (49.5%) of the respondents were aged 21-23 years, followed by 43.0% aged 18-20 years. The majority of the respondents (62.0%) were from urban areas while 38.0% were from rural areas. The vast majority (91.0%) were students, 5.5% were employed and 3.5% were both studying and employed. The nuclear family represented 62.0% of the respondents while the joint family constituted 31.0% of the respondents. In terms of academic level, over two-thirds (71.5%) had been enrolled in BS programs, while 18.0% and 10.5% were M and PhD levels, respectively. Phil and PhD-students, respectively. Almost half (47.0%) used mainly mobile phones for study purposes; 38.0% used mobile phones and laptops/computers. Over half (53.5%) said that they used the internet every day. Almost half of the respondents (48.5%) used AI tools mainly for completing assignments, followed by 29.0% for understanding concepts. Sixty-nine.5% of the respondents used Chatbots (including ChatGPT). Additionally, the majority of respondents (37.5%) used AI tools less than 1 hour a day, and 29.0% used them between 1–3 hours per day.

Descriptive Statistics
Table :1 Descriptive Statistics of Access and Ethics

Variables	Mean	Std. Deviation
Access	3.2342	.88278
Ethics	3.5700	.70977
Learning Behavior	3.9940	.64696

Descriptive statistics for Access, Ethics and Learning Behavior are reported in Table 1. The results indicate that the mean scores of all the variables are higher than the middle point of the scale,

which suggests that the respondents' responses are generally positive. The mean score for ethics (M = 3.5700), was higher than the mean score for access (M = 3.2342), indicating a more positive perception of ethics than access. The mean value of learning behavior in learning also shows relatively high values (M = 3.9940) which means that the students have positive learning behavior. The scores of the standard deviations reflect moderate variation in the responses, as indicated by the slightly higher variation in Access (SD = 0.88278) than in Ethics (SD = 0.70977). In summary, these results indicate that Access and Ethics have positive impacts on Learning Behavior.

Hypotheses : 1

H1 There is a significant correlation between Ethics of AI and students' learning behavior.
H0 There is a no significant correlation between Ethics of AI and students' learning behavior.

Table: 2 Correlation matrix of Ethics of AI
Correlation matrix of Ethics of AI

Construct Link	**Correlation (r)**	**p-value**	**interpretation**
Ethics → Learning Behavior	.438	.000	Significant

Pearson's correlation was used to investigate the correlation between ethics and learning behavior. The results showed the correlation coefficient r = 0.438, and the significance p = .000. The relationship between ethics and learning behavior is statistically significant because the p value is less than the acceptable significance level ($p<0.05$).

The correlation coefficient is 0.438, which shows a moderate positive correlation between the two variables. This indicates that the students who have a better level of ethical awareness and responsible use of AI have more positive learning behavior. That is, the students' ethical reflections on AI grow as their learning behavior improves.

The results are able to reject the hypothesis (H_0) and accept the alternative (H_1) so that ethics is highly correlated with students' learning behavior. The findings suggest that ethical values like academic honesty, transparency, responsible use of AI, and ethical awareness are crucial aspects of students' educational journey and learning habits.

Additionally, the positive correlation indicates that student use of AI tools in a responsible manner can lead to increased meaningful learning experiences, critical thinking skills, and academic integrity. This ethical consciousness can foster responsible attitudes toward AI in education, potentially reducing the risk of its misuse and ensuring that it serves as an effective tool for learning and knowledge building. This ethical awareness can help students use AI as a tool for education and learning, rather than as a means to cheat or plagiarize, thus minimizing the potential for its misuse and ensuring its proper use in the service of learning and knowledge building.

This is in alignment with earlier research which highlighted the significance of ethics in using AI in educational contexts. According to the study conducted by Qiyang Sun et al (2026), the implementation of AI in ethics has a positive impact on students' engagement and learning outcomes. Likewise, in their paper titled "Transparency and Responsible AI Usage in Education: Improving Student Learning Experience," Yuri Reina Marín et al. (2025) emphasized the benefits of transparency and responsible AI application in the learning environment. This is supported by Ajit Singh (2025) who stated that ethical awareness and responsible technology use is correlated with improved academic behavior and learning performance.

Hypotheses :2
H1 There is a significant correlation between Access of AI and students' learning behavior.
H0 There is a no significant correlation between Access of AI and students' learning behavior.

Table: 3 Correlation matrix of Access of AI
Correlation matrix of Access of AI

Construct Link	Correlation (r)	p-value	interpretation
Access → Learning Behavior	.383	.000	Significant

Pearson's correlation analysis was used to explore the relationship between access and learning behavior. The result showed that there was a strong correlation ($r = 0.383$; $p = .000$). The p value is below the commonly accepted 0.05 level of significance and therefore the relationship between learning behaviour and access is statistically significant.
The correlation coefficient obtained is 0.383 which is a moderate positive correlation between the two variables. The results indicate that students' learning behavior is positive if they have access to more Artificial Intelligence technologies, digital resources and institutional support. That is, the more students are exposed to AI learning materials, the more their learning behaviour improves.
The results show that there is statistical evidence to reject the null hypothesis (H_0) and accept the alternate hypothesis (H_1) which is that access is significant to students' learning behavior. This suggests that having access to AI tools, the internet, learning platforms, and tech support can have a positive impact on students' engagement and learning.
In addition, the positive relationship indicates that higher access to AI technologies is associated with greater students engagement in learning, better academic task performance and effective use of academic resources. Using AI tools can support students in learning independently, as well as enhance their information retrieval and their ability to access and engage with course content, which can help to enhance students' learning behaviors.
The results obtained are in line with the earlier research highlighting the significance of access to technology in educational contexts. The use of AI technologies positively impacts on student performance and engagement, as reported by Awwad et al. (2024). In the same vein, Belqes Al-Sowaidi and Amber Clarke (2025) pointed out that having access to digital resources and institutional support contributes positively to students' learning. This is further supported by UNESCO (2021) which stated that equity in access to digital technologies can be a driver to better educational opportunities and learning outcomes.
The analysis and literature indicate that access is one of the factors that affect students' learning behavior in learning environments with the support of AI. From the findings of this study, it can be inferred that there is a moderate positive correlation between the use of AI technologies and educational resources in higher education and the positive impact on learning practices and academic engagement. Based on the results of the study, it can be deduced that as the students' access to AI technologies and educational resources in higher education increases, the impact on learning practices and academic engagement is also likely to increase, but within a limited range.

Table :4 Regression Analysis Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
	0.486[a]	0.236	0.228	0.56831

Table :5 Regression Coefficients

Variable	Beta (β)	t-value	Sig.
Access	.234	3.368	.001
Ethics	.334	4.803	.000

To assess the effect of Access and Ethics on Students' Learning Behavior, the multiple regression analysis was used. Table 2.19 is the model summary which shows R value as 0.486 and R square as 0.236. This means that if they explain 23.6% of the variance in Students' Learning Behavior, then another factor not in the model may be responsible for explaining the rest of the variance.

Table 2.20 shows the regression coefficients, which indicate that both Access and Ethics are statistically significant variables affecting Students' Learning Behavior.

The results show that students' learning behavior positively and significantly influenced by Access ($p = .001$; $\beta = 0.234$; $t = 3.368$). This p-value is less than the alpha value of 0.05, indicating that the effect is statistically significant. The result indicates that students with higher AI technology access, institutional support, AI technology opportunities, and digital equity have more positive learning behaviors.

Likewise, the students learning behavior ($\beta = 0.334$; $t = 4.803$; $p = .000$) was positively and significantly influenced by Ethics. The positive beta coefficient suggests that there is a positive relationship between human sensitivity and transparency in using AI and learning behavior.

Based on the comparison of standardized beta, it shows that Ethic ($\beta = 0.334$) has a higher value than Access ($\beta = 0.234$) in influencing Students' Learning Behavior. Thus, Ethics proved to be the most significant predictor in Chapter 2.

This is similar to other studies. Marín et al. (2025) found that ethical AI practices have a positive impact on students' engagement and learning results. Likewise, Sun et al. (2026) highlighted that it was important to have a human centered and responsible AI that could enhance the educational experience. Moreover, Awwad et al. (2024) identified positive impact of access to AI technologies on students' outcomes, and Al-Sowaidi and Clarke (2025) emphasized the need for equitable access and institutional support for enhancing learning experiences.

From the regression analysis, the students' learning behavior is significantly influenced by both the variables, Access and Ethics, but the influence of Ethics is greater. The result indicates that the use of AI resources is significant, but ethical considerations like transparency and human sensitivity have a more significant impact on students' learning behavior.

Discussion

Based on the results of the present study, it is found that the two variables of Access and Ethics have significant effects on students' learning behavior. The descriptive statistics showed that Access, Ethics, and Learning Behavior were generally perceived positively, suggesting students' awareness of the significance of social aspects in educational contexts related to AI.The results of correlation analysis showed that there is a significant positive correlation between Access and Learning Behavior ($r = .383$, $p < .01$). The results indicate that the higher the students' access to AI technologies, institutional support, opportunities for AI use, and digital equity, the more positive learning behaviors they will demonstrate.

The results align with the study by Awwad et al. (2024), which found that the use of AI has a positive impact on students' academic performance and engagement. In the same vein, Al-Sowaidi and Clarke (2025) noted that when digital resources and institutional support are provided in an equitable manner, students' learning experiences are enhanced.The results also showed a significant positive correlation between Ethics and Learning Behavior ($r = 0.438$, $p < .01$). This discovery suggests that pupils with higher levels of transparency and human sensitivity awareness in using AI exhibit improved learning behavior.

These findings align with the findings of Marín et al. (2025) and Sun et al. (2026) who both noted the significance of ethical uses of AI in higher education and human-centered AI in educational impact. The results for the regression analysis showed that both variables, Access and Ethics, predicted students' learning behavior significantly. Ethics (β = .334) was the strongest predictor followed by Access (β = .234). The results indicated that the access to the resources of the AI is substantial but ethical consideration has a more significant influence on learning behavior of the students. In summary, the results suggest that the realization of ethical use of AI and equitable access to AI technologies is crucial for fostering positive learning behavior among university students.

Conclusion

The present study investigated the impact of Artificial Intelligence (AI) Access and AI Ethics on the students' learning behavior in Higher Educational Institutions. The descriptive results showed that the perception of respondents about the use of AI, ethical AI practices and learning behavior were mostly positive. The participants were undergraduate students, and they were often users of AI tools, especially chatbots, for academic tasks like completing assignments and understanding the concepts of the course. The results show that AI is emerging as a valuable educational tool among university students. The mean scores of the study variables were above the scale midpoint, indicating positive attitudes towards AI-aided learning. These results illustrate the increasing presence of AI technologies in students' learning processes and their openness to using AI to enhance their learning. The descriptive results indicate that the use of artificial intelligence has become more and more relevant in the modern context of higher education.

The inferential analysis also showed that students' learning behavior was significantly and positively correlated with the two variables, AI Access and AI Ethics. Moderate positive relationships were found between AI Ethics and learning behavior, and between AI Access and learning behavior through Pearson correlation analysis, meaning that students who are more aware of the ethical aspects of AI and have greater access to the AI technologies tend to show more positive learning behaviors. The results indicate that having educational resources at their fingertips with AI technology allows students to engage more actively in learning, and that an ethically aware attitude promotes responsible, transparent and appropriate use of AI in learning. The findings align with the hypothesis that technological access and moral responsibility are vital to an AI-enabled learning environment. Thus, the findings of this study support the idea that AI can be beneficial in enhancing students' academic engagement, provided that it is accessible and utilized responsibly.

The results of the multiple regression analysis also confirmed this because both AI Access and AI Ethics significantly affected the learning behaviour of students. These variables accounted for 23.6% of the variance in learning behavior, meaning that other variables also influence the students' learning achievement. While both predictors were found to be statistically significantly associated, AI Ethics was shown to be the most powerful predictor, indicating that ethics (including academic honesty, transparency, responsible use of AI etc., and human-centric decision making) play a more significant role in learning behavior than access alone. The results suggest a need for ethical consciousness and institutional support in order to have a significant impact on the utilization of AI technologies by students. The study finds that an AI-enabled learning environment that is both fair and responsible could boost students' learning behavior and improve the quality of higher education. The findings also offer valuable insights for educators, university administrators, and policymakers aiming to effectively and responsibly embed AI in the learning and teaching process.

Recommendations

The first step is for universities to create an AI-based learning environment by incorporating AI-powered learning tools into learning and teaching activities.

3. The educational system, including higher education institutions, should ensure that all students can have access to AI technologies, digital learning platforms, and trustworthy Internet facilities without any discrimination.

3. Academic institutions need to create clear ethical guidelines for the responsible and transparent use of AI in academic writing.

Regular training sessions need to be scheduled to promote the understanding of AI literacy and ethics among students and educators.

5. Faculty should stimulate the use of AI as a learning aid and foster critical thinking and academic honesty.

7. To effectively implement AI-powered learning, universities need to build up their digital infrastructure.

8. Policymakers need to develop institutional policies that encourage the responsible, equitable and sustainable use of AI in higher education.

9. Additional influencing factors on students' learning behavior should be explored to enhance the learning process in the future, and further studies could be conducted to study the implementation of AI in various fields and universities.

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