Survey of Students' Gadget Utilization to Know the Readiness of Personal Digital Inquiry Learning Implementation

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Abstract: This study aims to determine the readiness of students and resources to implement Personal Digital Inquiry (PDI) learning. The research method was conducted by survey. The survey was conducted on public high school students in Depok city. 346 respondents were willing to answer 19 questions through a Google Form. Questions were asked in the form of multiple choice, checkbox, and short answer, including class, age group, as well as questions about gadgets and their utilization. The survey results were presented in graphical form and analyzed descriptively. The results of the analysis show that overall students and teachers are ready to implement PDI learning. Students have gadgets that qualify as one of the means in the implementation of PDI; students have also been accustomed to utilizing gadgets for learning even though they have not been maximized; students' proximity to social media can be used as an opportunity to be integrated in PDI learning; students are familiar and accustomed to utilizing various applications and search sites that can support the process of implementing PDI. Some obstacles to the use of gadgets can be taken into consideration in the preparation of PDD implementation scenarios.

Keywords: Gadget utilization; Personal digital inquiry; Technology

Introduction

Advances in technology have led to the sophistication of gadgets that are increasingly adapted to human needs. Of course, these changes also have an impact on human life, especially lifestyle (Mayarestya et al., 2021). The development of the internet is also increasingly massive, which has led to the high duration of internet use in the world by 6%, in Jakarta the prevalence of internet screen time use is very high (more than 6 hours/day) by 34% (Kurniasanti et al., 2019). Technology also has positive and negative impacts on adolescents, one of which is phubbing, which is an addiction to looking at smartphones (Youarti & Hidayah, 2018). Social media is one of the applications that makes teenagers addicted to sending messages to each other, so they spend an average of 3 hours per day playing gadget (Hasya, 2023; Putra & Fitriani, 2019). Online games available on student gadgets cause

students to become addicted, which affects students' emotional intelligence and learning motivation (Elisa et al., 2022).

Based on this fact, teachers can take the opportunity to maximize technological advances and adolescents' addiction to gadgets in learning innovations that take advantage of students' daily lives (Zubaidah, 2016). The fact that teachers are not the only source of learning and digital developments are reasons that require learning to include technology in the process, because 21st century learning requires the development and empowerment of all the potential of students, one of which is the hobby of playing gadgets (Rahayu et al., 2022). Indonesia's low PISA scores in reading literacy and science literacy are also the reason for the need for meaningful biology learning (Corebima, 2016). A survey on the integration of ICT in covid learning into a new breakthrough in literacy showed effective and efficient results and provided several different effects (Agatep & Maquio,

2022). So the option to involve technology in learning is worth trying

Mastery of technology and media is one of the skills that must be mastered in the 21st century (Trilling & Fadel, 2009). This is because in the 21st century students are required to be able to compete and adapt not only on the cognitive side but also social, economic and political that can affect society so that students must be equipped and master 21st century skills, namely critical thinking, communication, collaborative, and creative. For this reason, learning carried out by teachers as much as possible can develop these skills. In 21st century learning, ICT is needed as a means of communication and collaboration in accessing information. In addition, the use of ICT requires the ability to process information critically and competently so that the information obtained can be used accurately and creatively. It can be said that ICT is promising to be used in developing 21st century skills (Joynes et al., 2019). To be able to develop 21st century skills, it is necessary to change the pattern of teacher centered learning to student centered. In addition, incorporating science concepts in science education is expected to help students solve real problems in everyday life (Pratiwi et al., 2019).

Exploration of 21st century skills in biology can be done through inquiry learning (Lee, 2012), because the 21st century learning innovation should lead to interactive, holistic, integrative, scientific, contextual, thematic, effective, collaborative, and learner-centered learning; so inquiry is one of the recommended learning (Muhali, 2019). Technological advances make the implementation of inquiry can also be assisted by gadgets. The strategy of integrating technology in inquiry learning has been tried through the use of academic blogs in learning, which can improve the quality of learning in the 21st century education era (Sari & Angraeni, 2023). Another study revealed that mobile learning-based inquiry has a significant impact on students' creative thinking skills (Suyatmo et al., 2023). The next study revealed findings that the development of an online-based inquiry learning model meets the valid, practical, and effective categories to improve students' 21st century skills (Novitra et al., 2021).

The involvement of technology in inquiry is needed to make students in the process of investigation (Coiro et al., 2016). Personal Digital Inquiry (PDI) helps students integrate scientific inquiry, and digital tools thoroughly to obtain deeper results and a more thorough understanding (Coiro et al., 2017). So it can be said that PDI is an inquiry that involves the involvement of technology in the stages of the process. The proximity of students to gadgets and social media as previously stated can be utilized to create a meaningful biology learning process by practicing collaboration skills in digging for information and increasing knowledge (Jey & Mau, 2021) and improving students' literacy, especially information literacy and science literacy through PDI (Sholihah et al., 2023; Tyansha et al., 2022). In the implementation of PDI in schools, it is necessary to extract information on the readiness of students, teachers and schools on the readiness of facilities and infrastructure to support the implementation of PDI in learning. This is supported by the results of previous searches in one of the Depok city public schools, that inquiry has been carried out but innovation is needed in its implementation but modification is needed in the form of inquiry innovation by maximizing student gadgets and teacher knowledge about technology. (Cahyaningrum et al., 2023). So this research is needed to follow up on the preparation of PDI implementation in schools.

Method

The research was conducted through a survey method on students in one of Depok city's public high schools. A total of 346 students answered 19 questions in a google form. The questions asked in the form of multiple choice, checkbox and short answer include class, age group, as well as questions about gadgets and their utilization. Answers from students were then recapitulated in the form of graphs and then analyzed descriptively by adding references from various relevant literatures. The following is the list of questions asked.

Table 1. The List of Question

Question	Form of question
Class	Multiple choice
Age	Multiple choice
Have a personal gadget that you use alone	Multiple choice
Types of Gadgets that I have	Checkbox
Number of mobile phones owned	Multiple choice
Brand of mobile phone/smartphone owned	Checkbox
There is an application for learning on mobile phones	Multiple choice
If there is an application for learning (digital learning), please write the name of the application (for example: Google classroom)	Short answer
What social media is installed on mobile phones	Checkbox

Question	Form of question
Have you ever used social media for learning purposes?	Multiple choice
Is there a gaming app on your phone?	Multiple choice
Average daily cell phone usage	Multiple choice
Length of time using mobile phone for learning purposes / utilizing learning applications / searching for information	Multiple choice
Length of time using mobile phone to play social media in a day	Multiple choice
Length of time using mobile phone to play games in a day	Multiple choice
Usually utilizing search sites (Chrome, Google etc.) on mobile phones in learning to...	Checkbox
Sources used in the search process on search sites...	Checkox
In your opinion, can gadgets (smartphones) be used as learning resources/media?	Multiple choice
If gadgets have not been optimally utilized in learning, what are the obstacles?	Multiple choice

Result and Discussion

The results showed that the respondents represented all classes, ranging from class X to class XII. Most respondents came from class X students totaling 272 people or 78.6%. the rest came from class XI 51 students (14.8%) and XII 23 students (6.6%). These results are in accordance with the target of implementing biology learning with PDI, namely biodiversity material in class X so that the results of this data can later be used as a foothold in the next research. Questions about age range are presented in the following graph.
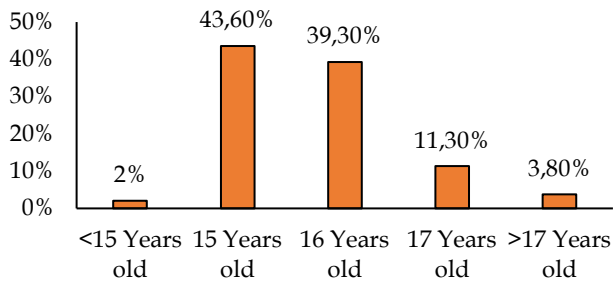

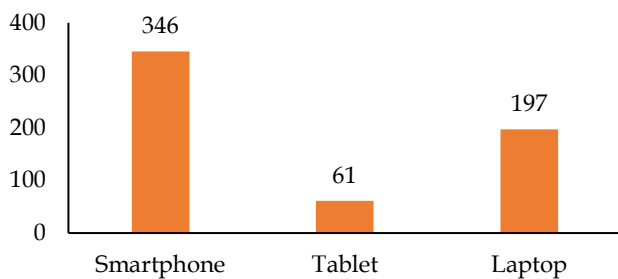**Figure 1**. Age distribution of respondents

Figure 2. Gadget type

Based on the figure 1, it shows that most respondents are in the range after 15 years (151 people, 43.6%), and 16 years old (136 students, 39.3%), followed by 17 years old (39 students, 11.3%), >17 years old (13 students, 3.8%), and finally <15 years old (7 students, 2%). This question item can be used to map the age of students who are ready to participate in learning using

PDI to be adjusted to the thinking ability of students in accordance with educational psychology. The age range of respondents shows that students are in the early adolescent (11-14 years old) and middle adolescent (14-17 years old) phases. The psychological characteristics at this age are that it is time to experience cognitive development, the phase of self-discovery and starting to be comfortable with seeking experiences with their peers. In this phase they have been able to follow the scientific thinking stage so that they are able to construct and analyze abstract concepts and thoughts into a concrete and logical conclusion (Suryana et al., 2022).

These characteristics support students' readiness to participate in learning with PDI, plus the data results show that almost all respondents (99.7%) have their own gadgets. There are some students who have more than one gadget, but all respondents must have a smartphone (346 students), gadgets in the form of tablets owned by 61 respondents and laptops by 197 respondents. Apart from having more than one gadget, some students also have more than one cellphone from 246 respondents, 300 respondents (86.7%) only have one cellphone, 44 respondents (12.7%) have 2 cellphones and 2 respondents (0.6%) have more than 2 cellphones. Data on the type of gadget is needed to support students' readiness to utilize gadgets in supporting PDI learning, because this learning requires paperless information search in its stages to then be constructed into new knowledge that requires literacy skills (Braasch et al., 2018).

Mobile phones owned by respondents come from various brands, which are well-known smartphone manufacturers. The following is a description of the mobile phone brands used by respondents (Figure 3) which are dominated by Samsung (106, 30.6%) and Iphone (87, 25.1%) products, followed by other Chinese mobile phones. There is one brand of mobile phone that was used by everyone at one time, but is no longer owned by respondents, namely Nokia. Mobile phone brand data is needed to ensure that the mobile phone used is a smartphone that can support maximum learning, because the use of smartphones can increase student learning motivation (Syahriani, 2023), student

learning outcomes (Hasbiyati, 2020) there is also a significant relationship between smartphones and students' concentration and interest in learning (Marhaeni et al., 2020).
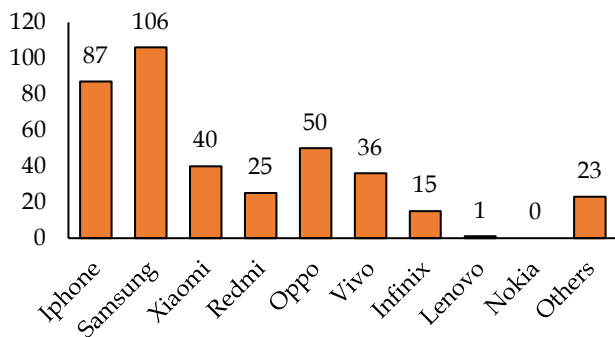

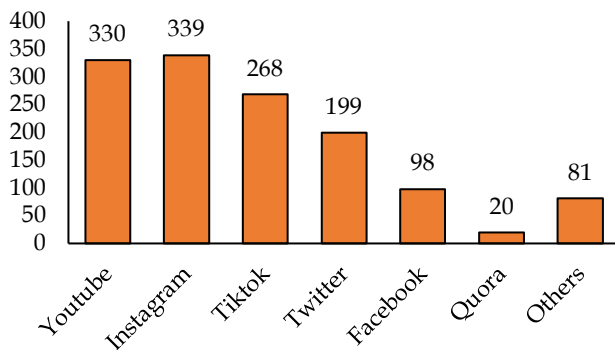**Figure 3**. Distribution of respondents' mobile phone brands

Figure 4. Distribution of social media on mobile phones

The next question about applications related to learning that are available on students' mobile phones, 345 (99.7%) respondents have learning-related applications on their mobile phones, only one person did not download learning-related applications. Applications related to learning that they have are dominated by Google classroom. This application has become popular among students in connection with the covid19 pandemic where distance learning requires a means to optimize interaction between teachers and students so that learning can be more effective (Marbun & Sinaga, 2021). Other applications include ruang guru, Quipper, Duolinggo, Canva, Photomath, Colearn, Gokreasi, KBBI, Quizizz and Kahoot. Based on this data, it can be summarized that the installed applications are related to various subjects that have used and needed these learning applications. However, of all the installed applications, none of the respondents have installed the Plannet application which will be utilized to help implement biology learning with PDI on planned biodiversity material, so this can be a note to add information to students by packaging it into LKPD which will help implement learning later. Based on

research, the utilization of plantnet applications in biology learning can increase learning motivation, classification skills and student presentation skills. (Asshoumy & Rahayu, 2023). PDI learning that will be applied later will be more helpful because students are familiar with the Canva application, where Canva provides a platform that is easily utilized by teachers and students in packaging more collaborative learning, so that Canva can be utilized as one of the digital tools in PDI (Coiro et al., 2017; Jamaludin et al., 2023).

Figure 4 illustrates the types of social media installed on respondents' mobile phones. Instagram is in the first place (330 respondents) followed by Youtube (339 respondents), Tiktok (268 respondents), Twitter (199 respondents), Facebook (98 respondents), Quora (20 respondents) and other social media (81 respondents). This shows that various types of social media are installed on students' cellphones, one cellphone can have more than one social media installed. but Instagram, YouTube, TikTok and Twitter are still the dominant ones. This is because these social media have their own characteristics that can be used to interact in cyberspace. Respondents are familiar and close to social media in their daily lives. In line with the survey results, it turns out that YouTube is the most popular social media (Anderson & Auxier, 2021).

In addition, Instagram, which is widely downloaded by respondents, can be utilized in project-based learning to improve students' critical thinking skills (Adekantari et al., 2020). As many as 340 (98.3%) respondents have used social media in learning, only 6 (1.7%) respondents have not used it, this can be used as a reference for innovating learning to take advantage of students' proximity to social media. Learning innovations involving social media have a significant impact on student collaboration with teachers as well as with peers (Ansari & Khan, 2020). The stages in PDI are wonder and discover, collaborate and discuss, participate and take action, analyze and reflect (Coiro et al., 2017). Each of these stages can utilize social media, so this data will help teachers to determine which social media will be utilized to support the implementation of PDI.
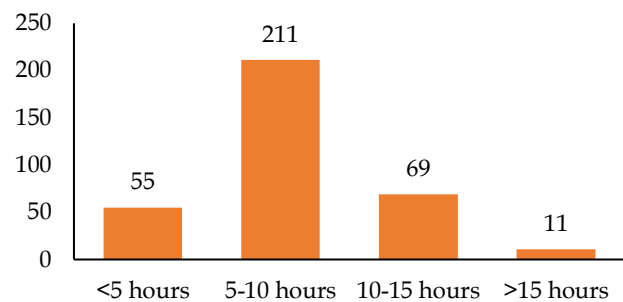

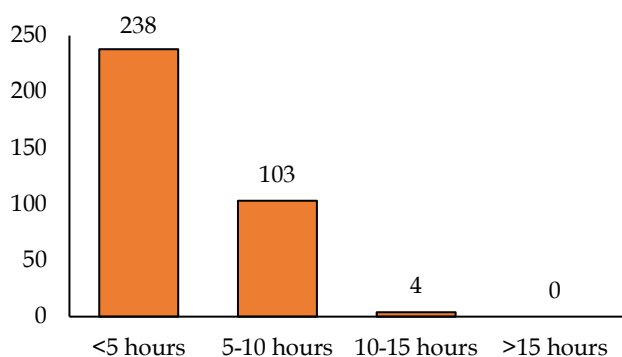**Figure 5**. Duration of mobile phone use

Figure 6. Duration of leaning acces

The next discussion is about the duration of daily cellphone use which can be seen in figure 5. On average, 211 respondents (61%) use cellphones for 5-10 hours, then 10-15 hours (69 respondents, 19.9%), <5 hours (55 respondents, 15.9%) and finally >15 hours (11 respondents, 3.2%). These results are in accordance with other surveys which state that the average screentime is > 6 hours / day (Kurniasanti et al., 2019). The duration of cellphone use is needed to analyze how long students interact with cellphones, making it possible to develop learning innovations that involve cellphones. The hope is that the duration of cellphone use is of higher quality. This statement is supported by the data in figure 6, that of all the hours of cellphone use for learning <5 hours is filled by most respondents (68.8%), because students mostly use their cellphones to play social media and games as can be seen in figures 7 and 8.
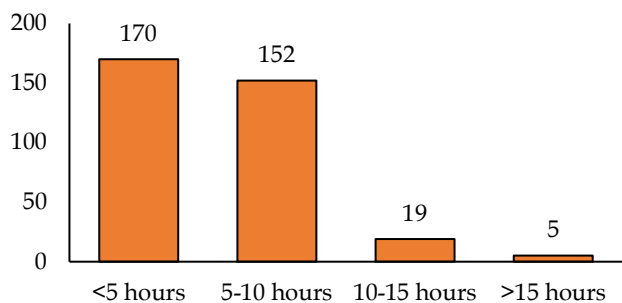

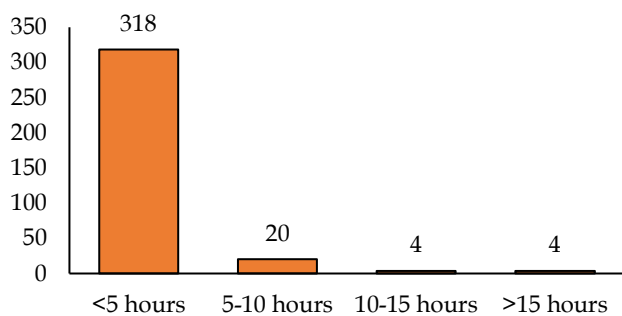**Figure 7.** Duration of social media acces

Figure 8. Duration of game acces

Figures 7 and 8 show that the duration of students' cellphone time is allocated to playing social media and games, with most respondents allocating more time to play social media. This fact can be used as an opportunity to utilize social media in learning. Research shows that students with any learning style can utilize social media to make learning more effective (Balakrishnan & Gan, 2016) by utilizing social media as a collaborative learning tool (Van Den Beemt et al., 2020).

Regarding the plan to use gadgets and social media in learning, further questions were given to respondents on the utilization of search sites on mobile phones to dig up information related to learning, as shown in figure 9 below. Based on the data, respondents used the new search site to search for images related to learning ((308 respondents, 89%) and to find answers to questions (267 respondents, 77%). Questions about utilization that is closely related to literacy are still few respondents who use it. Opening journals (200 respondents, 57.8%), reading the latest news (166 respondents, 48%), and reading E-books (153 respondents, 44.2%) and other activities (123 respondents, 35.5%).

These results can be an illustration that so far the use of gadgets in learning has been carried out but has not been maximized in a structured manner to train students to carry out literacy effectively, even though students have actually begun to be introduced to literacy by utilizing their gadgets, because based on the data, students still use their gadgets still focus only on looking for answers to questions and images rather than analyzing and looking deeper into certain things. This is in accordance with the results of research that shows the low level of digital literacy of students (Perdana et al., 2019). This is because digital literacy has several elements such as the ability to think critically, creativity, construct and evaluate information, and use digital media effectively (Al-Qallaf & Al-Mutairi, 2016). To prove this point, the data in figure 10, related to the sources searched in the search site. The data shows that Wikipedia ranks first as a reference source (260 respondents, 75.1%), followed by brainly (232 respondents, 67.1%), scientific journals such as Google schoolar, NCBI, etc. (228 respondents, 65.9%), others (140 respondents, 40.5%), blogspot (127 respondents, 36.7%) and photomath (111 respondents, 32.1%). This data is in line with the previous data, the top 2 search rankings are wikipedia which is a free and brainly encyclopedia that contains questions and answers about certain subjects that anyone can access, so its validity is still not accountable.

Furthermore, the question to respondents was the opinion about the utilization of gadgets as a learning resource, 336 (97.1%) respondents answered agree, and the remaining 10 (2.9%) respondents answered doubtfully and none of the respondents answered

disagree (figure 11). Student responses in utilizing gadgets in learning biology utilizing applications on Google Playstore have a positive response (Putri et al., 2020). The last question is about the obstacles to the use of gadgets in learning (figure 12). 101 respondents (29.2%) answered that there were other obstacles that caused the gadget not to be utilized for learning properly, then the social environment was answered by 88 (25.4%) respondents, 77 (22.3%) respondents are constrained by quota, 69 (19.9%) respondents are constrained by the remaining cellphone memory and the remaining 11 (3.2%) respondents are teachers who have not maximized gadgets in learning. This data can be used by teachers to prepare PDI lessons that pay attention to gadget utilization constraints so that PDI implementation can run smoothly.
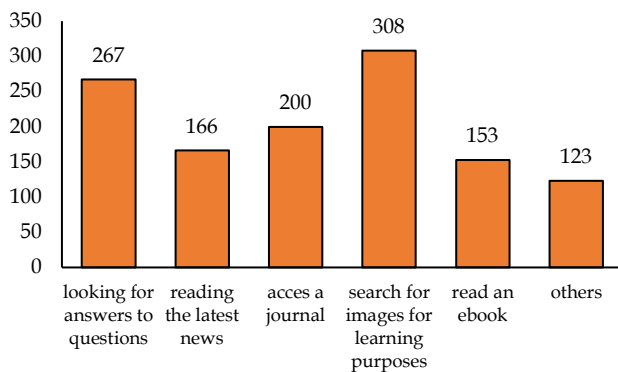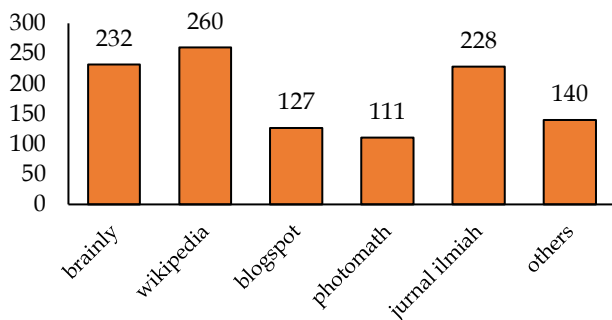

Figure 9. Search site utilization

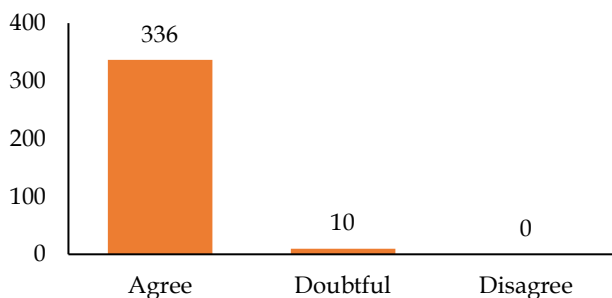**Figure 10.** Search of search sites

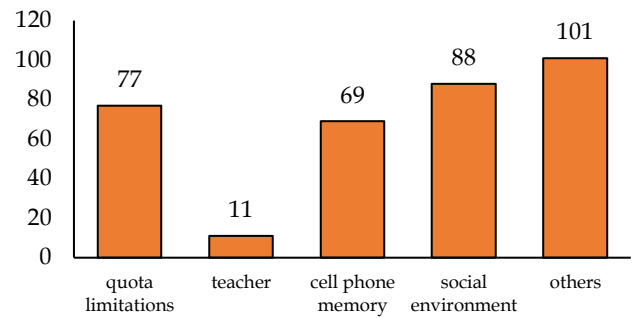**Figure 11.** Utilization of gadgets as a learning tool

Figure 12. Utilization of gadgets as a learning tool

Based on the data and the previous discussion, it can be said that students are accustomed to utilizing gadgets in learning but not yet optimal with various obstacles. The obstacle does not lie with the teacher in packaging learning but rather the habits of students and external factors that influence. The gadgets owned have met the standards to take part in learning with PDI, students are also familiar and accustomed to utilizing various applications and search sites that can support the PDI implementation process.

Conclusion

Based on the results of data analysis and discussion, it can be concluded that overall students and teachers are ready to implement PDI learning. Students have gadgets that qualify as one of the means in the implementation of PDI; students have also been accustomed to utilizing gadgets for learning even though they have not been maximized; students' closeness to social media can be used as an opportunity to be integrated in PDI learning; students are familiar and accustomed to utilizing various applications and search sites that can support the process of implementing PDI. Some constraints on the use of gadgets can be taken into consideration in preparing PDI implementation scenarios.

Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this paper.

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