

A Survey on External Distractions Affecting Students' Study Performance During Online Learning

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ABSTRACT

An increasing number of lectures in higher education are being held online. This study aimed to establish the nature and frequency of external distractions during online learning and to obtain students' opinions on whether distractions affected their study performance. We, therefore, conducted a survey with university students about external distractions during online learning and students' attention engagement using the adult ADHD (Attention Deficit-Hyperactivity Disorder) Self-Report scale. Eighty response sheets were collected, half of which were from Indonesian students in Indonesia and a half from Japanese students in Japan. The frequency of distractions for this study is described as the number of incoming visual, auditory, or audio-visual notifications from electronic devices, such as pop-up windows of software updates, battery warnings, chats, or e-mails. A number of distractions from other external events was obtained as well. From the survey, we discovered that about one-third (25-37%) of 80 students reported that their study performance was affected frequently ("often" or "always") by external visual, auditory, and audio-visual distractions from electronic devices. Moreover, a significant correlation was obtained between the perceived frequency of these distractions and the students' attention scores: Low attentional engagement was accompanied by a relatively high number of perceived distractions. Although online learning fulfills the need for social distancing and may make lectures or meetings easier to organize, it is not ideal for all students, given that many thought their study performance was affected by external distractions.

Keywords: Attention, External Distractions, Online Learning, Study Performance

1 Introduction

The number of online classes in higher education is gradually increasing. Online learning has benefits for students, e.g., saving traveling time, but in their online learning environment, students may have difficulty engaging their attention [1] and get easily distracted [2, 3, 4]. Furthermore, studies have argued that using mobile devices and computers during online learning can cause distractions, such as checking incoming notifications from social media [5] or the devices themselves.

Although there is ongoing research on the implementation of online learning and its efficacy, there have been few studies on how distraction perception relates to attentional engagement personality traits of students and how much students believe that distractions in their online learning environment affect their academic performance. This study wants to determine the students' perceived frequency of distractions and whether these correlate to the student's attention scores. For this purpose, we used an adult ADHD (Attention Deficit-Hyperactivity Disorder) Self-Report scale [6]. A high score on the ADHD Self-Report scale typically describes a person who has trouble getting organized, cannot apply total concentration, gets easily distracted, or even has poorer work or school performance [7, 8]. Previous studies have argued that students with ADHD symptoms were concerned about academic matters [9]. So far, there is little systematic data about how students' self-reported attention scores and their perceived occurrence of distractions during online learning are related.



An online survey was distributed to Indonesian students in Indonesia and Japanese students in Japan (n=80 in total) to address these issues. Note that in this study, we used the phrase “external distractions” to describe the incoming notifications from electronic devices in the student's learning environment, such as a mobile device or a desktop computer, either via social media or the device itself (e.g., software updates, battery notifications). External distractions were categorized as visual, auditory (sounds), audio-visual, and other events. Incoming visual distractions, for example, can be pop-up notifications (i.e., from social media activity, e-mail, and chats) that appear suddenly on device screens. Notifications can also be strictly auditory, i.e., consisting of sounds, such as warning tones or melodies. Notifications can be audio-visual too, for example, by combining a pop-up with a tone. Finally, external distractions may also come from other events that are not related to screen activity, such as distractions from humans, animals, or machines in the environment where the learning occurs. External distractions should be distinguished from distractions related to the learner's internal motivation, fatigue, or attentional engagement.

2 Research Methodology

2.1 Participant and Materials

The survey was distributed among students receiving university education in Indonesia and Japan. There was an open invitation to participate so every university student in any department could join. Before taking the survey, participants were informed about its objectives, explained that their private information would be protected, and asked to provide written informed consent. The participants' demographics are described below in Section 4.1 (Table 1).

The survey consisted of four sections. The sections concerned (a) students' demographic information and experience in online learning, (b) questions about external distractions during online learning, and whether distractions affected their study performance. This was followed by (c) the attention self-report and (d) an open question about online learning. The survey was created via Google with a single link. Before disseminating the survey, the survey was taken by five students as a pilot test to hear their feedback. Based on the feedback, pictures were added to illustrate what “external distractions from electronic devices” meant so that the student could get a clearer explanation of the survey topic. The survey link was then sent to students' group chats and social media (i.e., via Instagram, Facebook, WhatsApp, and Line) to recruit respondents. Students in higher education who had attended online learning from 2021 to 2022 were asked to respond. This approach collected the responses within a month (March 2022).

2.2 Survey items

The first section (a), regarding students' demographic information and experience in online learning, was based on that used in previous surveys [3, 4]. We picked up and revised questions for the purposes of our survey and made ten questions about online learning experiences from 2021 to 2022.

In the second section (b), eight statements were given regarding the students' distractions during online learning and whether these affected their study performance. Responses were obtained by using a five-point Likert scale from 1 (“Never”) to 5 (“Always”). The eight statements were as follows:

1. “I get distracted by incoming visual notifications (e.g., pop-up windows) from my mobile device or computer while attending online class”.
2. “I get distracted by incoming auditory (sounds) notifications (e.g., pop-up windows) from my mobile device or computer while attending online class”.
3. “I get distracted by incoming audio-visual notifications (e.g., pop-up windows) from my mobile device or computer while attending online class”.

4. "I get distracted by events other than those from my mobile device or computer (e.g., sounds from outside my room or somebody entering my room) while attending online class".
5. "When I get distracted by incoming visual notifications (e.g., pop-up windows) from my mobile device or computer while attending online class, it affects my study performance".
6. "When I get distracted by incoming auditory (sounds) notifications from my mobile device or computer while attending online class, it affects my study performance".
7. "When I get distracted by incoming audio-visual notifications (e.g., pop-up windows with sound) from my mobile device or computer while attending online class, it affects my study performance".
8. "When I get distracted by events other than those from my mobile device or computer (e.g., sounds from outside my room or from somebody entering my room) while attending online class, it affects my study performance".

In the third section (c), we asked the students to fill in the adult ADHD (Attention Deficit-Hyperactivity Disorder) Self-Report scale [9] by using a Likert scale from 1 ("Strongly disagree") to 5 ("Strongly agree"). This amounted to 18 items. The last section (d) of our survey consisted of an open question regarding the survey and/or the participant's opinions about online learning. All participants were requested to finish and answer all the questions from sections (a) to (d)

3 Data Analysis

Statistics software (SPSS, version 23) and R programs (R Studio 2022 "Spotted Wakerobin" Release for MacOS) were used to analyze the data. Frequencies and percentages were calculated for the survey's first part (a) concerning the participant's age, degree, nationality, and gender. For the questions in section (b) regarding the perceived occurrences of distractions during online learning and students' overall experiences, Pearson correlation coefficients were calculated to obtain correlations between the frequency of distractions and students' self-reported attention scores. We obtained an overall attention score for each participant by summing scores for all the items in the ADHD self-report [section (c)]. Following previous research [6], attention scores below 36 indicated students with high attentional engagement who were not easily distracted. Meanwhile, attention scores over 37 stipulated students with relatively low attentional engagement were more easily distracted. Percentages were also calculated to examine how much students thought their study performance was affected by external distractions.

4 Results and Discussion

4.1 Respondent Information

Forty Indonesian students studying in Indonesia and 40 Japanese students studying in Japan submitted their responses—51 males and 29 females between 18 and 45 years of age. The majority of the participants (52.5%) were Graduate students. The other respondents were Doctoral students (30%) and Undergraduate students (17.5%). Table 1 gives an overview of the students' demographics.

4.2 Students' experiences in online learning

During online learning in 2021-2022, students still followed online classes in real-time the most (52.5%), and they attended online classes for 2-4 hours more than three times a week. They used a mobile device and/or a desktop computer to access video-conferencing software such as Zoom or other software often used for online classes (e.g., Microsoft Teams). Maqableh and Alia [3] reported similar findings about the types of devices used and the number of classes. As for other (supportive) devices, students needed a microphone (31 students), a web camera (43 students), a drawing pad (5 students), a mouse (49 students), and a headset/headphone (plugin or Bluetooth; 68 students). Nine students did not need any other (supportive) device, and only 2 students used other than mentioned above. Most students followed online

classes by positioning themselves sitting on a chair with a table (80%). Nearly half of all students (41.25%) thought science subjects (e.g., Math, Biology, Chemistry, Physics) as the most challenging classes to follow online.

Table 1: *Students' demographic characteristics.*

Characteristic	Frequency	Percentage (%)
Gender:		
Male	51	63.75
Female	29	36.25
Age:		
18-28	61	76.25
29-45	19	23.75
Degree:		
Undergraduate Student	14	17.50
Graduate Master Student	42	52.50
Graduate Doctoral Student	24	30
Nationality:		
Indonesia	40	50
Japan	40	50

4.3 Frequencies of occurrence of external distractions

Before statistical analysis, the distributions of the frequency of external distractions and students' self-reported attention scores were tested for normality. Shapiro-Wilk tests showed a normal distribution ($p > 0.05$) for both the frequency of occurrence of external distractions ($p = 0.219$) and for the attention scores ($p = 0.415$). However, the scores obtained about the students' study performance about external distractions were not normally distributed ($p = .001$).

Secondly, after the normality test, section (b) regarding the students' distractions during online learning and their study performance was tested for internal consistency (reliability) in SPSS. The Cronbach Alpha (α) for this was 0.847. A Cronbach Alpha (α) greater than 0.8 indicates a good internal consistency [10,11].

Following this, Pearson correlation coefficients were obtained (Figures 1a-d). For the responses of all 80 students, a significant positive correlation was found between students' self-reported attention scores and the frequency of occurrence of visual distractions [$r(78) = 0.3$; $p = 0.008^{**}$; Figure 1a], auditory (sounds) distractions [$r(78) = 0.23$; $p = 0.038^*$; Figure 1b], and audio-visual distractions [$r(78) = 0.26$; $p = 0.021^*$; Figure 1c]. Figures 1a-c show that if the perceived frequency of occurrence of distractions of these types was high, the attention score was high as well. No significant correlation was found between students' attention scores and the frequency of distractions by other events [$r(78) = 0.17$; $p = 0.138$; Figure 1d]. Next, we calculated Pearson correlation coefficients between the self-reported attention scores and the occurrence of each type of external distraction for each student group separately (Indonesian and Japanese students). A significant correlation was found only for Japanese students [$r(38) = 0.43$; $p = 0.006^{**}$] between the attention scores and the frequency of visual distractions. No significant correlations were found for the data of Indonesian students.

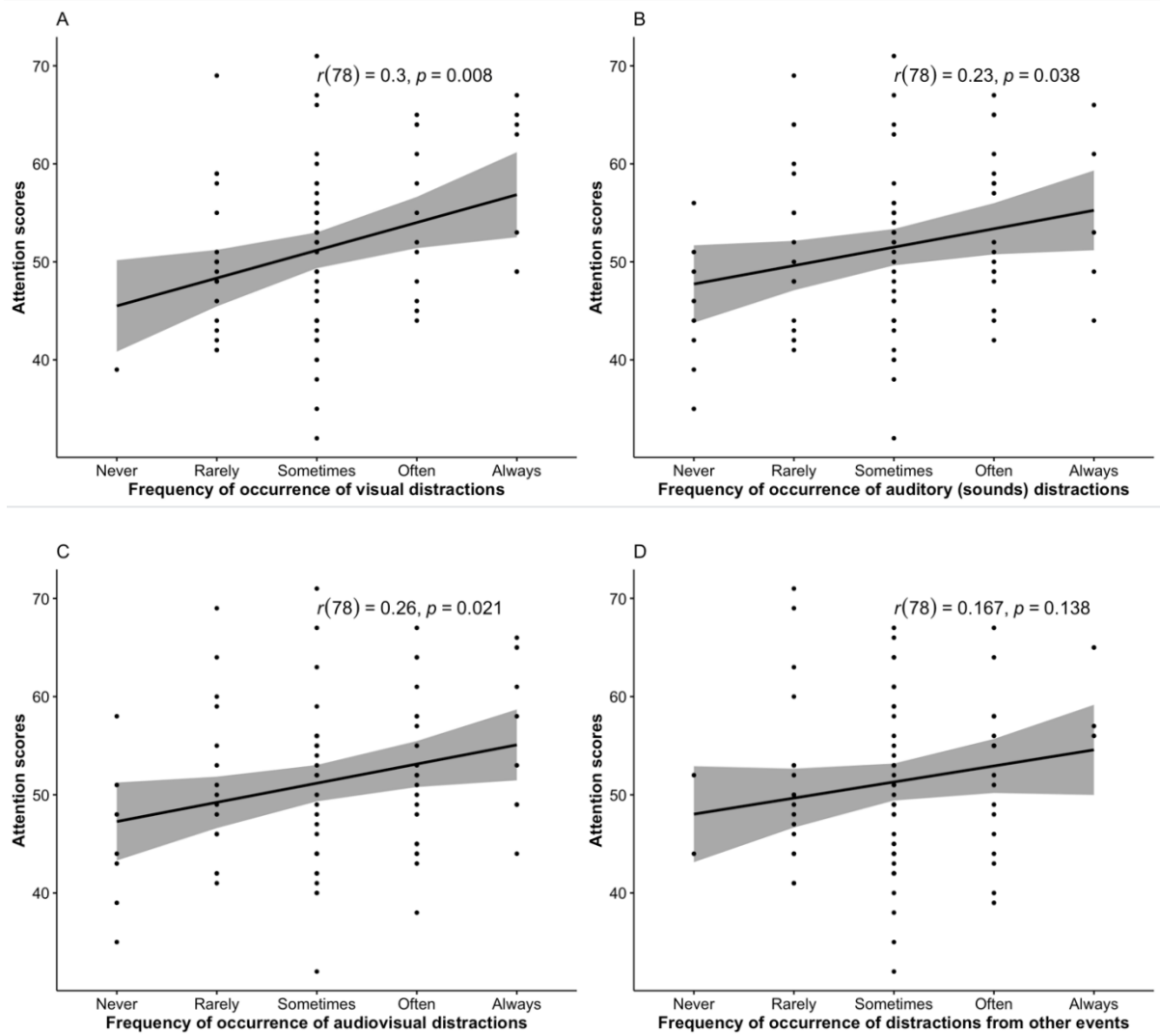


Figure 1a-d: Pearson correlation coefficients between the frequency of external distractions from students' electronic devices during online learning and attention scores (n=80). Distractions from incoming a. visual notifications, b. auditory (sounds) notifications, c. audio-visual notifications, d. other events.

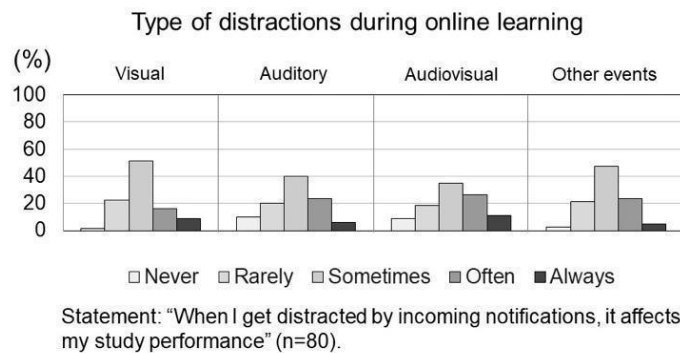


Figure 2: Students' judgments (n=80) about whether distractions by incoming notifications from their electronic devices during online learning affected their study performance.

4.4 Distractions and Students' study performance

Figure 2 shows students' judgments on whether various distractions affected their study performance. For example, 35-51% of the students thought that they were “sometimes” distracted by incoming notifications

when attending online learning, using a mobile device or a computer, in such a way that their study performance was affected. On top of that, about one-third (25-37%) of the 80 students reported that their study performance was affected frequently (“often” or “always”) by external distractions.

5 Discussions and Conclusions

Higher education institutes are increasingly implementing online learning for students. Maqableh and Alia (2021) reported that about 72% of undergraduate students in Jordan (Western Asia) tended to get easily distracted during online learning using electronic devices [3]. Schmidt's (2020) study showed that using cell phones or other electronic devices would cause distractions, such as “buzz” notifications from social media (e.g., chats), that could negatively affect study performance and cause loss of attentional engagement [12]. According to another study [4], online learning in India seemed challenging not only because of distractions from electronic devices and poor internet connections but also from the physical online learning environment itself, for instance: interruptions from relatives and noises coming from both the instructors' side and the students' side. Based on these previous findings, in this study, we aimed to investigate the connection between distractions, mainly from electronic devices during online learning and students' self-reported attentional engagement, by distributing the adult Attention Deficit-Hyperactivity Disorder (ADHD) Self-Reported scale [6] for students in Indonesia and Japan.

Compared with Maqableh and Alia's study [3], our survey showed that when students had to attend online classes, they could get distracted by three types of notifications from electronic devices: visual, auditory (sounds), and audio-visual distractions. The (self-reported) frequency of occurrence of these distractions correlated significantly with the (self-reported) attention scores. A high perceived frequency of distractions was accompanied by low attentional engagement. From the correlation analyses, the attention scores correlated significantly with the frequency of visual distractions from electronic devices only for Japanese students. No significant correlations were found for Indonesian students regarding this. Given the different socio-economic backgrounds of the students in Indonesia and the students in Japan, we assumed that there would be differences in online learning experience regarding the use and readiness of online learning. However, the results between the two student groups did not differ much. Generally, regarding the relation between attention and perceived distractions, it must be noted that we only made Pearson correlation analyses, and no causal statements can be made of “which caused which”. More research is necessary on this issue.

Similar to Schmidt's study [12], the students who filled in our survey thought their study performance was affected frequently (“often” or “always”) by external visual, auditory, and audio-visual distractions from electronic devices. In conclusion, our results clearly show that although online learning may be convenient even without the necessity for social distancing, it may not be suitable for many students. It was because of the sheer number of external distractions in their learning environment from electronic devices. Note that the present survey reflects the students' perception, showing that – fortunately – the students recognized the problem.

6 Declarations

6.1 Acknowledgments

This study was conducted entirely online in Indonesia during the Covid-19 period with the help of many students. Achieving a larger sample of responses among the two countries was not easy, so we sincerely thank students in Indonesia and Japan who shared their thoughts and interests in this preliminary study.

6.2 Funding Source

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6.3 Competing Interests

The authors declare no competing interests.

7 Human and Animal-Related Studies

7.1 Ethical Approval

This research procedure was pre-approved by the Ethical Committee of the Faculty of Design, Kyushu University, Japan (approval number: 131-7).

7.2 Informed Consent

Informed consent was obtained from all respondents before filling in the survey questions. They were informed about the purpose of the study and told that the information they would provide would be used, possibly, for data publication of group means. We guaranteed their privacy: no personal information would be used (their data entry would be numbered), and the data of single individuals would not be disclosed.

7.3 Publisher's Note

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