

# Intensity of Gadgets Usage for Achieving Prime Social and Cognitive Health of Adolescents During the COVID-19 Pandemic

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## ABSTRACT

Before the COVID-19 pandemic, studies in 2018 and 2019 recommended limiting the use of gadgets by adolescents to 3-4 hours a day because prolonged use can interfere with learning and cognition related activities. The use of gadgets also needs to be limited so that adolescents are more productive in using their time, and have social interactions with their environment. The participants of this study were 1,277 vocational school students and teachers in three cities namely Salatiga, Belitung, and Manado. Data were collected through questionnaires, observations, and interviews. However, during the time COVID-19 pandemic, there was a change in the pattern and intensity of the use of gadgets by adolescents. This caused changes in the postulate boundaries of the use of gadgets that are considered normal. This change is caused by student and teacher learning activities. Among these is the use of learning facilities through various types of video conferencing. During the COVID-19 pandemic, adolescents become used to doing online learning for 3-4 hours a day. In addition, the use of gadgets for other activities such as playing games, browsing, and other activities continues. Thus, based on additional field findings and studies from other sources, this study found that the use of gadgets by adolescents for up to 8 hours a day during the COVID-19 pandemic is recommended.

**Keywords:** Gadgets, intervention, pandemic, video conference

## 1. INTRODUCTION

In 2018, the society has entered the era of the Industrial Revolution 4.0 which is marked by the increasingly dominant role of information technology, including the role of electronic gadgets. As a means of exchanging information and communication, gadgets are inseparable from the daily life of the younger generation. Apart from the positive effects of using gadgets, several studies [1] - [3] have found the negative effects of excessive use of these gadgets.

These problems occur in their social life and mindset. Adolescents are especially prone to these problems. About 48% of adolescents use gadgets for 5-7 hours per day for social media purposes such as liking photos on Facebook, Twitter, Instagram, WhatsApp without considering that the time they waste on social media should instead be used for academics. On average, these individuals only seek to attain bachelor's degree (65%), D3 (12%), and certification (8%) [2].

Adolescence is a transitional developmental period from childhood to early adulthood [4]. When a person enters the stage of adolescent development, he/she will

experience physical, cognitive and psychosocial development. Adolescents experience cognitive development in the form of the ability to think abstractly and using scientific reasoning [5]. Thought in adolescence becomes more abstract, idealistic and logical [4]. However, adolescents are still immature in terms of attitudes and behaviors [5].

Gadgets are widely used by children and adolescents, who generally show high level of competence in using technology. A study showed that 82.8% of adolescents (aged 11-18 years) spent 1 to 4 hours a day online [6]. Gadgets are used as a means to access the internet.

Gadget use among adolescents is a common phenomenon. One of the many uses of gadgets is to access social media, which happens to be one of the most common activities children and adolescents engage in today. These social media sites provide entertainment and offer a means of communication for adolescents and children. Social media sites allow teens to stay connected with friends and family, make new friends, and share ideas [7]. The reason why adolescents use gadgets is because adolescents like to explore, and they spend more time with friends than parents in this developmental stage [5], [8]. Adolescents use gadgets for various purposes, from playing games,

listening to music, watching videos, accessing information and social media via the Internet [9].

In addition to social media, many people use expensive and luxurious gadgets as a form of social appearance, in addition to reducing uncomfortable feelings during social contact with other people. Other reasons for excessive use of gadgets have to do with external control, material, social interaction anxiety and the need for attention. As a result, individuals lack self-control in using gadgets, leading to internet dependence, and excessive use of credit cards [3].

Furthermore, one reason why adolescents use gadgets is to play games. Several studies have demonstrated the existence of video game-related behavioral addiction, which appears to be similar to other forms of addiction in terms of its characteristics and consequences [10]. The American Psychiatric Association (APA) even includes Internet Gaming Disorder (IGD) in the appendix of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5) [11]. A study showed that IGD seems to be connected with various psychological symptoms, behavioral problems and social problems. Problematic gamers tend to use dysfunctional coping strategies as diversion and avoidance, that playing video games is done with the intention of overcoming problems and difficulties [10].

In line with Bandura's theory of Observational Learning [12], intensive, daily exposure to games and life in cyberspace has the potential to form a belief within their users either consciously or unconsciously, that the real world works like how cyberspace works. This belief has the potential to cause problems in the way they solve problems in everyday life, and the way they relate to the real world.

Excessive use of gadgets causes a number of adverse effects on a person's mental and social health. Another research conducted by Karadag, Tosuntas, Erzen, Duru, et al. [13] revealed that individuals feel anxious, worried, unhappy, disappointed, highly depressed as well as experiencing expectation, hope and curiosity when they are not actively using their gadgets. Furthermore, the study also discussed individual views on how gadgets changed their lives positively in terms of interpersonal relationships and negatively in terms of personality, where individuals feel isolated from the social environment and unable to make eye contact with other people.

Therefore, an effort must be made to reduce excessive use and intention of using gadgets. However, the COVID-19 pandemic has resulted in a number of major changes in everyday life. The COVID-19 pandemic has dire implications for the health, emotional and social functioning of individuals and collective health. COVID-19 increases the risk for mental illness caused by emotional distress resulting from a variety of factors. This emergency public health condition can affect the health,

safety, and well-being of both individuals and communities, one of which is the closure of workplaces and schools. This can lead to: (a) various emotional reactions, (b) unhealthy behavior, (c) and non-compliance with public health directives. Moreover, some groups may be more vulnerable than others to the psychosocial effects of the pandemic [14].

In addition to the stresses that come with the disease itself, there are directions for mass confinement at home, including stay-at-home orders, quarantine and isolation. In the current pandemic, directions to stay at home for a large proportion of the population for an indefinite period is likely to increase stress [14]. The COVID-19 also affects education. While the COVID-19 pandemic continues to spread around the world, many countries have decided to close schools as part of physical distancing policies to slow transmission and ease the burden on health systems. UNESCO (United Nations Educational, Scientific and Cultural Organization) estimated that 138 countries have closed schools nationwide, and several other countries have implemented regional or local closings. This school closure affects the education of 80% of children worldwide [15].

This study intends to answer the question of how much gadget usage can achieve healthy social and cognitive conditions for adolescents during the COVID-19 pandemic. Based on the current phenomenon of the COVID-19 pandemic, the researchers are interested in researching the intensity of gadget usage that can achieve prime social and cognitive health for adolescents.

## 2. GADGET USE

Some theories that can be used to explain behavior related to the use of gadgets are Fishbein and Ajzen's Theory of Reasoned-Action (TRA) and the Technology Acceptance Model (TAM) originally proposed by Venkatesh and Davis [17], [18].

There are several factors that influence gadget use. Research conducted by Chiu [1] showed that poor interpersonal relationships, family and emotional stress affect the level of gadget addiction. Most frequent use of gadgets is by individuals aged between 20-25 years (50%), this shows that individuals of that age are more aware of technological advances than individuals over 35 years of age. Individuals over 35 years of age think that owning a gadget is something luxurious and unnecessary, while individuals between 20-25 years old are mostly not yet married, so they use gadgets to strengthen relationships or find partners through social media. Gadget addiction is more prevalent in women than in men under 25 years old which indicates that female adolescents are more addicted to using gadgets. In this case, the individual show no self-control [2].

Excessive internet use poses a number of negative effects. Andreassen et al. [19] described video gaming addiction as a result of gadget addiction. Using an application on a gadget for games increases stress and self-perception

problems in individuals. Jap et al. [18] explained that problems caused by excessive online gaming include loss of sleep, escapism, mood disorders, aggression, physical injury, and addiction. Lee, et al [3] found that there are types of stress associated with excessive use of gadgets, for example, excessively checking social media notifications, which then becomes an indicator of gadget usage problems.

The phenomenon of gadget use can be explained based on the fundamental theory of Theory of Reasoned Action (TRA) derived from social psychology. This theory explains how and why attitude influence behavior, as well as how and why beliefs affect how people act. This theory has 3 general constructs, which are intensity of behavior, attitudes, and subjective norms. This theory claims that a person's behavior is regulated by the individual's behavioral intentions in showing it and the intention itself is regulated by the person's subjective attitude and norm towards said behavior. Subjective norms refer to a person's perception of others who he/she thinks are important and to think whether he/she should behave that way or not [20].

In line with technological developments, Theory of Reason Action (TRA) was further developed to explain the behavior of using technology. Technology Acceptance Model (TAM) is a concept presented by Davis [21]. Davis then described three components of TAM, namely: (a) perceived ease of use, (b) perceived usefulness, and (c) use. Perceived ease of use is defined as the ratio of individuals who believe that using a particular technology has become easier. Perceived usefulness is a comparison of individuals who believe that using certain technology can increase one's productivity. Usage is a concept that shows human behavior in using technology in a certain context. The main purpose of TAM is to explain the intention behind the use of current technology and then predict the behavior of technology usage [22].

Jap [23] explained the reason why Indonesian adolescents engage online games using the TAM model. This model explains that perceived ease of use, and perceived usefulness affect the intention to engage in online games, which in turn will affect the use of online games.

A similar statement was expressed by Joo and Sang [24] in their research in Korea. They predicted that the use of gadgets is more influenced by perceived ease of use than by the desire to use the gadget itself. Therefore, gadget use in Korea is influenced by cognitive motivation and goal orientation rather than habitual motivation and without the purpose of usage. Korean people purchase gadgets based on perceived benefits, especially special features that help them optimize and manage their gadgets by having applications that suit their needs. In contrast, formerly widespread communication tools in Korea were traditional gadgets developed with programs that

restricted applications and were difficult for users to freely control.

Based on the concepts above, it appears that the need for convenience and benefits will determine the intention of using gadgets. To determine the intensity of the use of gadgets that can achieve healthy social and cognitive conditions for adolescents during the COVID-19 pandemic, the habits and intentions of said adolescents before the pandemic COVID-19 needs to be studied. This data can then be integrated with educational demands and needs of adolescents during the COVID-19 pandemic. An important guideline in determining the intensity of the use of gadgets is that the social health and cognitive health of these adolescents are very important factors.

### 3. METHOD

The method used in this research is a combination of qualitative and quantitative research (mixed method). This research is a descriptive study, which aims to describe a phenomenon, to further make predictions based on the observed phenomenon. The research participants were 1,277 Vocational High School (SMK) students and teachers in three cities, including Salatiga, Belitung, and Manado. The choice of location was based on the consideration that the citizens on the island of Java form a large part of the Indonesian population, while these locations have little macro cultural variations. Furthermore, the decision to set the research locations outside Java was made based on the importance of evaluating the differences in macro and micro cultural variations as well as acquiring samples from cultural contexts outside Java.

Data were collected through questionnaires, observations, and interviews with teachers and students of Vocational High Schools (SMK). Participants in this study amounted to 1,277 participants with 247 male students and 1030 female students. Participants were between 14 years old and 20 years old, but dominated by students aged 16 years old.

### 4. RESULT

Several countries have decided to close schools as part of physical distancing policies to slow transmission of COVID-19 and ease the burden on health systems. There are 138 countries that have closed schools nationwide, and several other countries have implemented regional or local closures [15]. School closures are also in effect in Indonesia. The Ministry of Education and Culture implemented education policies during the COVID-19 pandemic by putting the health and safety of students, educators, education personnel, families and the community a top priority in determining learning policies.

In addition, the Ministry of Education and Culture also takes into account the growth and development of students and the psychosocial condition of adolescents in the provision of educational services during the COVID-19 pandemic [25].

The government then implemented a new policy that allows face-to-face learning for all levels in the green zone and yellow zone. As for areas in the orange and red zones, face-to-face learning is still prohibited. Schools in these zones continue to study from home (SFH). The data shows that 57% of students are in the red and orange zones (in 238 districts / cities), while 43% of students are in the green and yellow zones (in 276 districts / cities) [25].

This affects the use of gadgets among adolescents.

The results of the research that will be presented below will be in the form of research data conducted in 2018 and 2019 before the COVID-19 pandemic. These data were then integrated with the results of an analysis of learning needs during the pandemic, based on observations and interviews with a limited number of adolescents, to produce predictions of data that may appear during the pandemic. Based on research conducted by Jap in 2019, the average adolescent used gadgets for 2-4 hours / day. Adolescents tend to agree on reducing the intensity of gadget use and they also agreed with the suggestion of limiting gadget use to only 3 hours / day. This can be seen in further detail in Table 1. Table 1 shows the responses of students when asked to limit the use of gadgets to 3 hours / day. Data were obtained from 1,277 participants in this study, but 13 participants refused to answer the question. Therefore, the data from 13 participants were omitted from data processing.

Students' answers when asked to limit gadget use to 3 hours/day show that the most students (28.49%) chose option 4 on a scale ranging from 1 (pleasant) to 7 (unpleasant). This means that these students are neutral when asked to limit the use of gadgets to 3 hours per day. In fact, students who agreed to limit their use of gadgets to 3 hours per day amounted to 39.16%, slightly higher than students who did not agree to limit gadget use to 3 hours per day (32,36 %). Students who strongly agreed to limit gadget use to 3 hours per day (10.84%) is higher than students who strongly disagreed if their use of gadgets is limited to 3 hours per day (8.86%). This research was conducted in 2019 before the pandemic [26].

**Table 1**

Percentage of Student Answers when Asked to Limit the Use of Gadgets to 3 hours / day

No.	Frequency	Percentage
1	137	10.84 %
2	131	10.36%
3	227	17.96%
4	360	28.49%
5	189	14.95%
6	108	8.54%
7	112	8.86%
<b>Total</b>	<b>1264</b>	<b>100%</b>

**Description:**

1: Pleasant

7: Unpleasant

Of 1,277 participants, 13 participants did not answer the item.

Since the COVID-19 pandemic occurred, it is impossible to limit the use of gadgets to a maximum of 3 hours / day. This is because gadgets are used for online learning, and adolescents are used to doing online learning for 3-4 hours / day. Adolescents often have to work on assignments using their gadgets. Thus, it is necessary to set a maximum time limit that students are expected to be able to adhere to, without compromising their social and cognitive health.

Observations on several high school students found that they often need to go through learning activities with teachers, structured activities, and independent activities for a maximum of 6 hours a day. Thus, if the student must do other activities outside of the class hours, it is hoped that the activity lasts for a maximum of 2 hours. Based on review of previous research, observation on learning needs of adolescents, as well as studies of other data sources, this study estimates that during the COVID-19 pandemic, the use of gadgets for a maximum of 8 hours for high school adolescents is recommended.

In addition to the inquiry on the intensity of the use of gadgets, the researchers also examined the types of gadgets used by adolescents. Based on data obtained before the pandemic, more adolescents use Smartphones / Mobile gadgets (96.54%), rather than Laptops (1.73%) and Personal Computers (PC) (1.73%). This can be

examined in detail in table 2. Out of 1,277 participants, 3 participants refused to answer, and were omitted from data processing, and so the number of participant data was 1,274.

During the COVID-19 pandemic, the use of gadgets is estimated to shift from being predominantly smartphones to mostly laptops or personal computers (PCs). The use of laptops is estimated to be more suitable for learning and working on tasks compared to using smartphones.

During the research before the COVID-19 pandemic, there were schools that collaborated with network service providers to enable adolescents to use learning applications via smartphones. However, the schools consider this to be less effective because the small screen proved it difficult for adolescents to learn information [26]. However, it is estimated that some adolescents are still using smartphones for online learning.

**Table 2** Gadgets used to access the internet

	Frequency	Percentage
Smartphone	1230	96.54%
Laptop	22	1.73%
PC	22	1.73%
Total	1,274	100%

Before the COVID-19 Pandemic, the authors' research showed that gadgets were more often used for non-academic purposes, such as for social media, playing games, and browsing the internet. In other words, the intention to use gadgets among adolescents is more for entertainment purposes.

However, this has changed since the COVID-19 pandemic, because the use of gadgets is required for long distance online learning. The use of gadgets is necessary for academic purposes, that adolescents may experience difficulties if gadget use is limited to only 3 hours a day. During the COVID-19 pandemic, adolescents were forced to participate in long distance learning. The intention of using gadgets, which previously were mostly for entertainment purposes, is thought to have also changed to include academic purposes. However adolescents are also thought to continue to use their gadgets for non-academic purposes, especially for communication due to limited direct interaction.

The presence of COVID-19 has forced many schools to participate in long distance learning. Subjective norms in gadget use changed soon after. Changes in attitudes, intentions and norms are in accordance with the Theory Reasoned of Action (TRA). TRA describes the ways, beliefs and reasons for attitudes to influence a person's behavior. The behavior of using the internet for online

learning is based on intentions, attitudes and subjective norms [17].

Learning activities that involve the use of gadgets are supported by the decision of the Ministry of Education and Culture which perpetuates the availability of a Long Distance Learning (PJJ) platform. The establishment of the PJJ platform was to support students and teachers in the teaching and learning process during the COVID-19 pandemic.

The Ministry of Education and Culture also encourages learning with a combination model, in which teachers and students will continue to apply technology combined with face-to-face method as an integrated learning method. This expands learning aids not only in the form of textbooks, but various technological platforms that have been utilized in PJJ during the pandemic [23].

Online learning and internet use is expected to not be widespread and sustainable. This is due to school policies that adapt to the situation where the pandemic is located. Several schools in the green and yellow zones have started to continue face-to-face learning according to the Ministry of Education and Culture's policies. However, for schools that are still in red and orange zones, face-to-face learning is prohibited.



**Figure 1** Data collection in a Vocational High School



**Figure 2** Data collection in one of the target cities

## 5. CONCLUSION

This research has found the intensity and patterns of gadget use among adolescents prior to the COVID-19 pandemic. Adolescents who used gadgets primarily for entertainment did not object to restricting the use of gadgets to 3 hours per day. However, in line with changes in learning activities that occurred during the COVID-19 pandemic, based on additional findings in adolescents during the COVID-19 pandemic, an analysis of the needs of adolescents, and the purpose of using gadgets, it was found that the intensity and patterns of gadget use are different. This is due to changes in limits of gadget use that are still considered normal.

The change in the intensity of the use of gadgets is due to learning activities that utilize long distance learning infrastructure. Students and teachers use various types of video conferencing to conduct online learning. During the COVID-19 pandemic, adolescents are estimated to participate in online learning for 3 to 4 hours a day on top of other use of gadgets such as playing games, browsing and other activities that are expected to continue. Thus, based on additional field findings and studies from other sources, to achieve positive social and cognitive health, this study found that the use of gadgets for up to 8 hours a day during the COVID-19 pandemic is recommended.

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