DIGITAL TECHNOLOGY: THE EFFECT OF CONNECTED WORLD TO COMPUTER ETHIC AND FAMILY

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***Abstract*—The development of digital technology such as smartphones, tablets and other gadgets grows very rapidly in the last decade, so does the development of mobile applications for those mobile systems or smartphones. Unfortunately, those applications often do not specify the age range for their users. This is actually a problem in the world of digital technology and software development. It is not yet known whether the applications are good to be used for children or not. Nowadays, parents are faced with the dilemma of allowing their children to use these modern gadgets, which often lead to serious addiction or keeping them in the dark and risk raising ignorant kids. This study shows 80% of respondents agree or strongly agree that the gadget will affect the development of children social skill. Therefore, in this study, the framework for ethical assessment is introduced and it can be applied to digital technology included gadget and its application in order to mitigate the negative effect of digital technology and gadgets.**

***Keywords*: Ethical Aspects; Assessment Tools; Engineering Ethic; Ethic Education**

I. INTRODUCTION

Science and information technology have brought tremendous benefits for the human civilization. The world is improving better than expectation. People in the world are becoming healthier, wealthier, more educated, more peaceful, increasingly connected, and live longer. Of course, science and information technology provide many answers to the global challenges but development of science and technology also has the negative effects to our civilization, especially in children [1–4].

Technology advances make people more efficient in their ways of doing things, and these processes get results. For example, education has been greatly advanced by the technological advances of computers and gadget [5]. Students are able to learn on a global scale without ever leaving their classrooms. Agricultural processes that once required dozens upon dozens of human workers can now be automated and it means cost-efficiency for farmers. Medical discoveries occur at a much more rapid rate and it allows for more intense educational research into medical matters [6–8].

There are many advantages that have come since the introduction of digital technology and gadget within classrooms of all education levels. Each advantage and disadvantage can be argued and debated over whether it is correct or not. A common consensus for this debate is that the quality of education does not depend on the technology in the classroom but on the teacher who is able to take the needs and abilities of their students into account when using any form of technology in the classroom. Although there are many advantages of the digital technology in the classroom, there have been arguments about whether it is the computer and gadget or the students that are doing all the work [9]. Because information can be accessed quickly and displayed through multiple mediums, there are fears that children and students might not remember information because they can now look it up elsewhere. There are also people who argue that children are losing basic knowledge and reading skills because of their use of technology.

Since a large amount of the new technology is made for an independent uses, there are valid concerns about the loss of interpersonal and cooperation skills that children and students usually develop within a classroom setting. Even though gadgets such as

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smartphones, tablet, etc., with the social media and networking are incredibly useful and fun time killers, but they can change teenager's life completely. These digital technologies can influence the relationship with friends and family. These are real issues in parenting in digital age.

The framework for ethical assessment is introduced in this research and it can be applied to digital technology included gadget and its application. In addition, it has been an issue about the right time to introduce children to gadget and Internet and the consequences if children are addicted to gadget and Internet. Finally, it will be discussed how to parent our children about safely using gadget and Internet.

The development of digital technologies and Internet provides a wonderful platform for parents and teachers to engage and interact with our children. However, these digital technologies may also raise new issues.

New digital technologies such as iPads and smartphones are revolutionizing family life [10]. Children and parents now have a growing stream of new technological resources on their fingers. It offers increased opportunities for engagement, entertainment and education. However, anecdotes about families and media abound, empirical evidence on national trends is much harder to come by. This study explores how parents are incorporating new digital technologies (iPads, smartphones) as well as older media platforms (TV, video games, and computers) into their family lives and parenting practices including: What does the family media and technology environment look like today? How widely have mobile media technologies been adopted? Are they making parents lives easier? How does the role of newer technologies compare to traditional technology platforms like television, or to other technologies such as computers and video games? How do parents use media and technology as a parenting tool, to help them get things done, or to educate their children? What role do media and technology play in family together time? How do different parenting practices and parents own levels of media and technology use affect the use patterns of children at home?

These issues are the same when many children are addictive to watch television. Parents do not let the media win as rivals for your children's minds and hearts [11]. Television has to be kept under parents discriminating control. Parent control of this powerful medium enhances children's perception of parent strength. Parents act as rulers in their houses and they will have nothing in their houses that consider or treat other people as mere things to pornography (or anything like it), gratuitous violence, disrespect or rudeness. Parents have to show their children that they will not permit any outside influences in their home that end their conscience and undermine their lessons of right and wrong. Media under parent control leads to family life improvement. Parents will find much more time to converse with their children, a fundamental basis for shaping their powers of judgment. There is more time to read and do homework assignments carefully, a basis for a standard of professionalism. Parents and their children will have more family solidarity and family life becomes a real sporting adventure and as it is for many families, an ongoing experience of pleasant sensations contrived to escape boredom.

The digital technology, Internet and gadget are products of technology where many experts and engineers in all disciplines involved in the product development. In creating and developing the gadget and its applications, the engineer from computer engineering and information technology plays a very big role. Therefore, engineers in information technology need to act to solve the negative issues in the gadget development and its applications. Reference [12] describes the rationale and formulation of a framework for the ethical assessment of new and emerging technologies. This research presents the foundation of a framework for ethical assessment that can be applied to new and emerging technologies in ways that are accessible to practicing professionals. Using examples of application areas as test cases, this research explores the possibilities and limitations of the framework in scenarios. Reference [13] says that valid and reliable assessment tools are sorely needed to evaluate better so that our students and practitioners not only can have sufficient background understanding related to science and engineering ethics but also they can apply this knowledge in real-world situations.

II. METHODS

Engineers of computer science should participate actively in combating the negative effects of digital technology such as smartphone and gadgets including their applications such as social networking. In this study, the modification of Secure Software Development Life Cycle (SDLC) [14–18] is introduced in development of software or application. Points are added at which an application ethic consultant should get involved to identify the potential issues for children, review the solution, validate the solution, and evaluate the system for ethical issues.

Figure 1 shows proposed methodology to include the ethic review in SDLC. There are five points added in SDLC process that needs to be considered:

1) Ethical design requirement. In this point, the application that matches to the age of users has to be designed.
2) User ethic analysis. At the end of requirements and at the beginning of design process, it is needed to analyze the overall of the negative effect of the application.
3) Identification of issues and solution. When the design process is going on, it may find other issues. At this point the designer has to give the solution for the issues.
4) Formal and informal validation. All of the solutions can be validated during the process of coding.
5) Ethical evaluation, internal review and external review. At the end of SDLC process, the entire system or application need to be evaluated and reviewed

This research begins to collect data by sending the questionnaire to participant in International Parenting Seminar titled Challenges of Parenting Children in a Connected World with the Effects of Social Media on the Family in Jakarta, Indonesia. In this questionnaire, the negative effect of digital technology is acquired.

After it is ensuring that many people agree about the negative effect of digital technology, then the checklists are built to help application developers to include ethic assessing in building the application. The next steps are grouping the checklist into five groups and injecting these five groups into SDLC.

III. RESULTS AND DISCUSSION

To analyze the negative effects of the digital technology such as smartphone and gadget, it is necessary to consider the possession of them by the children. On the other hand, the parents also need to understand the negative effects of gadget for the development of children in social interaction. The data clearly says that most of respondents agree on gadgets negative effects toward development of children.

Figure 2 shows that total 77% respondents agree and strongly agree on the negative effects of social networking to children. It is clear from these data that the parents already know the negative effects of social networking, but they do not know how to overcome this negative effect.

In addition, the data regarding when children should be told about passwords in Fig. 3 shows that 85% of parents teach the importance of passwords at the age above 7 years. These data show that many parents do not understand how important passwords in digital technology, so they are too late to teach the understanding of the importance of passwords to their children. In the connected world, the understanding of the importance of passwords should be taught to children as early as possible. Creating strong passwords is essential to protect our accounts. Getting their children involved in an early age sets a great habit for life. We can begin in our family by explaining to our children how strong passwords would let them keep secrets from their friends and strangers.

The digital technology and gadget also can affect the children's social life. Children who spent more time with the gadget will become less care and less communicative to others. It means they have poor social skills or serious problems in communication. As showed in Fig. 4, 80% respondents agree and strongly agree that the gadget can affect the social life of children. American scientists have found that sixth-graders who went five days without a smartphone, television or other digital media did better at reading human emotions than sixth-graders from the same school that spend hours each day with their gadgets.

The digital technology, internet, and social networking offer wonderful experiences for growing and inquisitive young minds. Social networking on social media has removed the barriers between a young person public and private matter. Children can become vulnerable and compulsive; therefore, online sharing can be hazardous. Children are gaining access to social

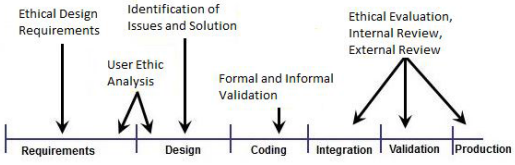

Fig. 1. The Ethical Review in SDLC Process.

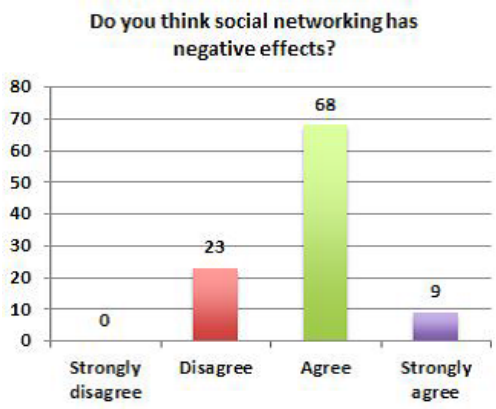

Fig. 2. Dispersion of the Negative Effects of Social Networking.

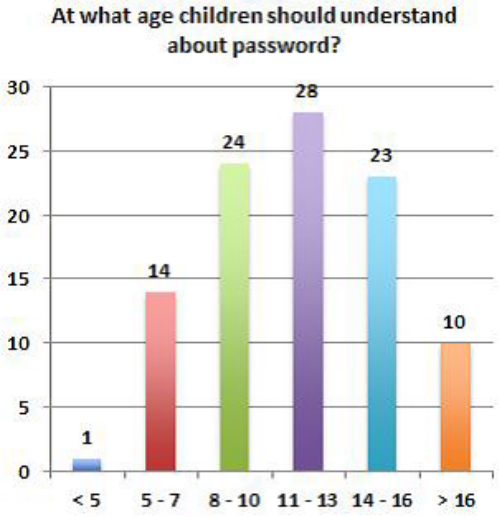

Fig. 3. Dispersion of the Children Age Whom Should Understand the Password.

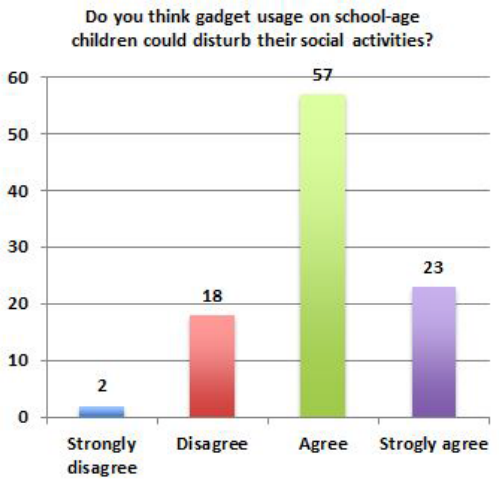

Fig. 4. The Negative Effects of the Gadget in Social Activities.

media sites at a younger age, which could expose them to content, people or situations that are out of their depth in which they're not emotionally prepared for. Social networking websites have minimum age requirements that must be met before a person can sign up. For example, both Facebook and MySpace require that a child be at least 13 years old to use their websites. In Fig. 5 show, 86% respondents said that the children can access social networking above the age of 11 years. There are 14% respondents said that children can access the social networking at the age below 10 years. Based on these data, it is clear that some parents do not know about the risk by creating the social networking for children and uploading in-

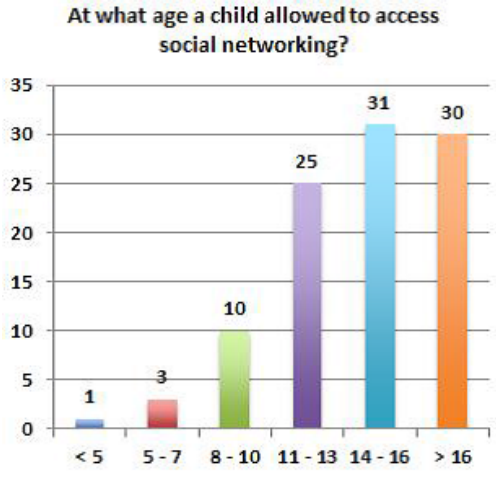

Fig. 5. The Age a Child Can Access Social Networking.

formation about our family. It is important for parents to understand the potential effects and even risks of posting personal information and photos of their child online. After all, it is never too soon to start thinking about a child Internet privacy and reputation.

It is clear from the data obtained that the use of gadgets and digital technology have a negative effect on the development of children and even the use of social uncontrolled can lead children in a threatened state. Therefore, Ethical-Secure Software Development Life Cycle (E-SDLC) is introduced as shown in Table I and Fig. 1.

In Table I, it can be seen that the component of ethic is injected based on the age, the developers have to give a check mark depending on the age in their applications development. The component of E-SDLC can be explained as follow:

- Requirement: At the first process of SDLC, requirement gathering, the ethical design requirements and user ethic analysis are included.
- Design: In this step, the process identification of issues and the solutions are added. This process is very important to ensure there is no issue in the next process.
- Coding: In coding process, formal and informal validation is added to the process.
- Integration, validation, production: the last three steps in SDLC are added, such as ethical evaluation, internal review, and external review.

IV. CONCLUSIONS

Many software products on the market are specifically geared toward the preschool crowd. These products can really help in giving a child a head start

TABLE I
THE CHECKLIST OF ETHICAL-SECURE SOFTWARE DEVELOPMENT LIFE CYCLE (E-SDLC)

Ethical-SDLC		Age					
		<5	5–7	8–10	11–13	14–16	>16
Requirements	Specification analysis						
	Ethical design						
	User ethic analysis						
Design	User ethic analysis						
	Architecture review						
	Issues identification						
	Proposed solution						
Coding	Formal validation						
	Informal validation						
	Tools and language						
Integration, validation, production	Ethical evaluation						
	Internal review						
	External review						

on learning skills such as reading and basic mathematics. However, some online applications such as social networking can affect social skill development as well as threat to the children. It is important for parents to remember that some things should be kept private. Once we uploaded a photo of children birthday party or mention children name, age, school, nickname, hobbies, interests or the names of his or her friends, parents could be providing a stranger with enough information to gain the children trust.

This research found 77% of respondents agree or strongly agree that social networking has negative effects to the social life and 80% of respondent agree or strongly agree that the gadget will affect to the development of children's social skill. These are the big issues in digital technology; therefore the ethical-software development life cycle is introduced as the method for the application developer in the process of building the application. Five processes were added in SDLC such as ethical design requirements, user ethic analysis, identification of ethical issues and the solutions, ethic validation, and ethical evaluation.

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