Usability of Parental Control Application Features To Protect Children From Negative Internet Impact By Using MAGIQ Approach (Case Study In Indonesia)

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Abstract. Technology today has become the lifestyle. The Internet The Internet already is gripped easily because of the fastest connection speed. It also affects the lives of children. However, content on the internet can cause a more prominent impact especially the adverse effects which influence the children. Therefore parents should selectively choose for their children. One solution that parents can protect their children by using the Parental Control Application by filtering, blocking and monitoring. Studies conducted to view the usability of Parental Controls is useful or not for parents, especially in Indonesia. Measurements were made using the MAGIQ approach where the results obtained were Effectiveness (0.3652), Productivity (0.3109), Satisfaction (0.1907), and Safety (0.1332). This study emphasizes that the success of Parental Control Application need to be supported by changing parents' mindset thus parents can consider, choose, and take decisions in viewing the positive and negative effect of using the Internet.

Keywords: internet, parental control, MAGIQ.

1 Introduction

The Indonesian government has given internet's protection for children by name is Internet Sehat. However, sometimes it is not working because of website admin have changes domain, and the children can reaccess it. The lousy content of website such as porn, hating speech, cyber-bullying, and deviant behavior can be accessed everywhere by children. Website contents such as manga and anime which have a substance of adult and distorted images can obtain quickly. Therefore, it is the importance of the role of parents to protect their children.

The parent can make a rule for their children to do not open the computer, or do not buy a smartphone except they have reached their youth (range between 13 to 19). Many cases in Indonesia, the children were not supervised by parents, such as letting children use technology just because they do not want to hear their child's whining. The result, the children, has an internet addiction[1], a speech delay[2] (lack communication), mature earlier, and abuse by irresponsible adults.

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However, According to [3] it has different knowledge generation gap between parent and children in use internet. Thus making a parent must learn how to use the internet to find potential threats. Based on a study of [4], the Internet does not affect prosocial behavior and a sense of nationalism in urban and rural societies. However, it will happen if the internet is not the main issue as part of daily needs and lifestyle[1].

The lifestyle which it changes drastically because of technology, attaches people to hold their gadget to spend their free time or connected with business partners. It makes early childhood quickly get acquainted with the technology. Once the children love their new toys, the parent will difficult to stop the children from using it. A few days later, parents only watch their children change their behavior.

One of the ways to prevention is to use the software which it can help a parent to protect the children, such as Parental Control. The functional main of Parental Control is filtering website which can harm the children's mind. Parental Control can be alternative for the parent to monitor children's behavior on surfing the internet, such as Adguard, Qustodio, K9 Web Protection, Open DNS Family Shield, Windows Live Family Safety, and other Parental Control which cannot mention one by one.

However, according to [5] that many parents still used ineffective parenting strategies when dealing with child misbehavior. Because of that reason, the study is needed to look at Parental Controls usability whether allows featured on the application used by parents is useful or not. The sample for this study will be conducted in Indonesia, especially in a megapolitan area of Jakarta and its surroundings, namely Jabodetabek (Jakarta, Bogor, Tangerang, and Bekasi) which the people live in the area use internet as a part of daily needs and lifestyle.

2 Methodology

2.1 Multi-Attribute Global Inference of Quality

Similar to Indonesia, the children use the Internet had increased at younger ages in Malaysia [6], the result shows that the rate of Internet usage among adolescents and school children is alarming. Comprising of 30% that the parent had a lack of responsibility that it makes the weak relationship between them. Using parental control application features needs the attention of parent to monitoring activity of children surfing the internet. Therefore, it needs to find the usability of application features by doing a questionnaire to determine the right decision. Decision-making mechanism has several methods that can use in many cases such as [7]–[9], and so forth. Decision-making on this study using MAGIQ (Multi-Attribute Global Inference of Quality). The concept is similar to AHP. However, The MAGIQ uses rank order centroids (ROC) to convert system comparison attributes into normalized numeric weights and then computes an overall measure of quality as a weighted sum of system ratings, the first proposed by McCaffrey[10]. The MAGIQ's equation illustrated in the formula of ROC [11] as follows :

$$[\sum_{i=k}^{N}(1/i)]/N \quad (1)$$

2.2 Usability of Parental Control Application

Usability is one of six main quality characteristic of The ISO 9126-1[12] software quality models; which other five are functionality, reliability, efficiency, maintainability, and portability. Parental control usability means to find out features to be understood, learned, used and attractive to the user; especially protection children from negative internet impact. Hence, the MAGIQ processing for the usability of Parental Control Application Features illustrated in Figure 1. [12]

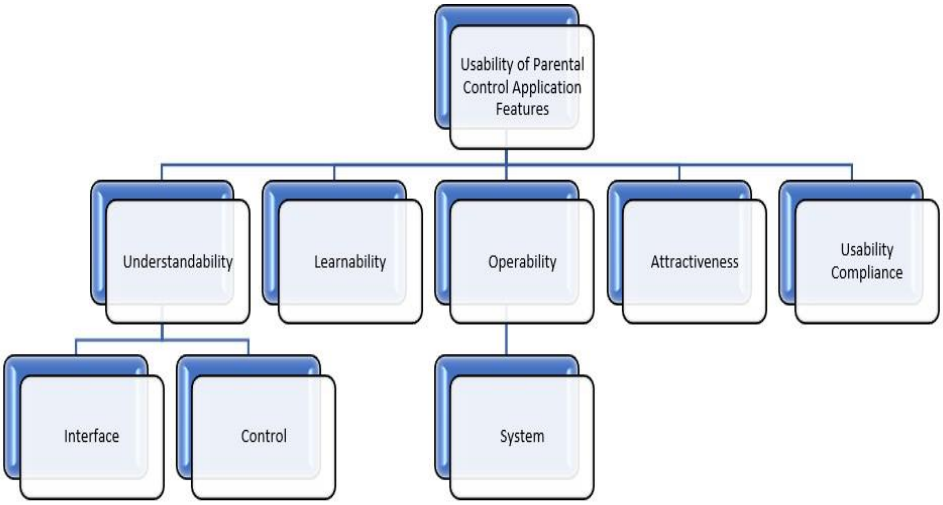

Fig. 1. Usability of Parental Control Application Features.

Figure 1 needs to be viewed based on quality in the use of features in which the criteria are effectiveness, productivity, safety, and satisfaction illustrated in Figure 2. [12].

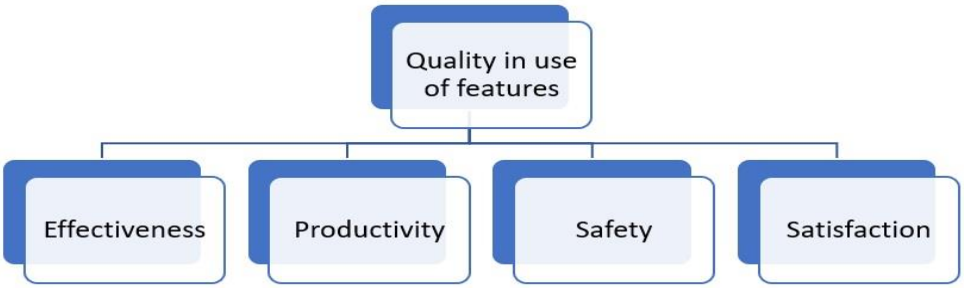

Fig. 2. Quality In Use of Parental Control Application Features.

2.3 Method Process

The steps based on MAGIQ are as follows :

1. Determine the priority criteria along with the subcriteria which based on Figure 1 and Figure 2. The priority criteria determined by questionnaires, in the way of compare which its importance.
2. Develop weights by calculates the ROC of the Criteria and also the subcriteria according to equation (1).
3. Determine priority for the Quality in use of features in Figure 2 in each criterion in Figure 1; the way is to calculate the weighted average rating for each decision the quality in use of elements. Calculate the weighted average rank similarly to AHP[8].

A questionnaire Development, There are several methods to use for constructing a questionnaire; the concept is respondents compare one criterion with the other. For example, there are five criteria (assumption c1, c2, c3, c4, and c5) should choose which is more substantial with the question: Which one the more necessary, c1 or c2, c1 or c3, c1 or c4; until to find priority criteria[11]. It will be more comfortable if done by an expert respondent by merely determining the priority level. If there are ordinary respondents, who assign the priority need to use pairwise comparisons. It is a purpose to examine the consistency of selection from respondents. Pairwise comparisons can handle Koczkodaj such as scale[13] and Saaty scale[14] for the judgment. This study using Saaty scale (1-9 scales) which commonly for AHP method then the appraisal calculation apply Geometric Mean[15] for the weight average of questionnaires. Afterward, construct a pairwise comparison matrix which the process same as AHP, its need to examine whether the value filled by respondents has been consistent <= 0.01 with Consistency Ratio (CR) calculation[14] as follows:

$$CR = CI/RI \tag{2}$$

CI is Consistency Index[14], which the equation is as:

$$CI = (\lambda_{max} - n)/(n-1) \tag{3}$$

Where λ_{max} is the largest eigenvalue of the pairwise comparison matrix and n is the number of compared criteria or system. Criterions in the study use n= 1 (System), n=2 (Interface and Control), n= 4 (Effectiveness, Productivity, Safety, and Satisfaction), n = 5 (Understandability, Learnability, Operability, Attractiveness, and Usability Compliance). Therefore, random consistency index RI as follows :

Table 1. Random Consistency Index. [14]

N	1	2	4	5
RI	0	0	0.9	1.12

As a note, The MAGIQ became useful when there is no weight on eigenvector (as priority determination) of each criterion is the same ranking as determination weight of ROC, as stated in McCaffrey's article that MAGIQ is used to accelerate the process and validate the value of the AHP System if the compared criteria are more complicated[10].

3 Result and Discussion

3.1 Result

Priority of criteria and sub-criteria for Parental Control Application Feature obtained from 100 respondents, i.e., parents with age range 27- 43 years in Jabodetabek area. They are 80% of women; consist of 50% workers and 30% homemakers, and 20% of men who have children aged 3 to 14 years; they are also smartphone users. The judgment for each criterion is assessed by CR <= 0.01; the result obtained ranking sequences are: The first rank or priority level is Operability (subcriteria is System), The second is Understandability (with the first subcriteria is Control and the second is Interface), then followed sequentially, i.e., Learnability, Usability Compliance, and Attractiveness.

The criteria and subcriteria where calculated the ROC based on the priority level, which overall value is 1, for example, the criteria number as above is five, i.e., Operability, Understandability, Learnability, Usability Compliance, and Attractiveness as follow :

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N =5; weight1 = (1 + ½ + 1/3 + ¼ + 1/5)/5 = 0.4567
      weight2 = (0 + ½ + 1/3 + ¼ + 1/5)/5 = 0.2567
      weight3 = (0 + 0 + 1/3 + ¼ + 1/5)/5 = 0.1567
      weight4 = (0 + 0 + 0 + ¼ + 1/5)/5 =   0.09
      weight5 = (0 + 0 + 0 + 0 + 1/5)/5 =   0.04
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Based on priority level, the weight is Operability (0.4567), Understandability (0.2567), Learnability (0.1567), Usability Compliance (0.09), and Attractiveness (0.04). The calculation is the same as the criteria for subcriteria, where the results obtained are System have 1 (no criteria compared), Control has 0.75 and Interface have 0.25. The overall results obtained from the MAGIQ illustrated in Table 2:

Table 2. The MAGIQ Result. Internal Data Source.

	Understandability		Learnability	Operability	Attractiveness	Usability Compliance	
	0.2567			0.4567			
	Interface	Control		System			
	0.25	0.75	0.1567	1	0.04	0.09	Overall
Effectiveness	0.5208	0.2708	0.1458	0.5208	0.1458	0.1458	0.3652
Productivity	0.1458	0.5208	0.2708	0.2708	0.2708	0.2708	0.3109
Safety	0.2708	0.1458	0.0625	0.0625	0.0625	0.5208	0.1332
Satisfaction	0.0625	0.0625	0.5208	0.1458	0.5208	0.0625	0.1907

Determine priority for the quality in use of features done by calculate the weighted average rating based on the hierarchy level. Example :

The calculation for Effectiveness are :

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(0.2567*0.25*0.5208)+(0.2567*0.75*0.2708)+(0.1567*0.1458)+(0.45
67*1*0.5208)+(0.04*0.1458)+(0.09*0.1458)= 0.3652
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Same calculation also is done for Productivity, Safety, and Satisfaction, so the results obtained are Productivity (0.3109), Safety (0.1332), and Satisfaction (0.1907). Therefore, the overall proceeds for MAGIQ concluded that the ranking quality in use for Parental Control Application showed in Table 3 :

Table 3. Ranking quality in use. Internal Data Source

Excellence In Application Feature	Ranking
Effectiveness	1
Productivity	2
Safety	4
Satisfaction	3

3.2 Discussion

Effectiveness, This criterion gets the highest weight value of 0.3652; Parental Control Applications most useful for parents, because the parent can block the content or application which harm the children. Most Parents who have toddler will prevent age-inappropriate videos on Youtube. The reason why parents block is each footage have an adult of content, or not matched for their children's age.

Productivity, Parents can block the websites and applications they want, but some parents did not supervise through Parental Control what sites their children visit. Hence, the weighted value obtained from Productivity is 0.3109 or 15% lower than Effectiveness.

Satisfaction, Parents feel satisfied using Parental Control because no need to worry anymore their children access the website that has a negative impact. They just blocked it without knowing why their children are opening access.

Safety, Safety gets the lower weight value of 0.1332 which has two argument views on Parental Control Application.

Pros. Parents feel safe that their children can not access the internet what they want. Their children cannot change the password whom their parents made it.

Cons. What parents do is blocking, it make the children did not feel comfortable. Somehow, the children search on the Internet how to unblock forbidden application or uninstall Parental Control. Children's knowledge of technology more than their parents. Therefore, the Parental Control Application not always safeguarded. Many reasons why the children will find a way how to access the forbidden website; The parent just blocking it without giving a reason why to their children, they just said no and didn’t provide understanding to their children. Sometimes, parents compare their children’s habits with their childhood lives. Therefore, It needs communication between parents and their children, for example, the parent must discuss game applications what their children play or what kind of video their children watch. What the children to do on the internet, their parents must sit beside them.

4 Conclusion

Based on the criteria rank which described above, Parental Control Application Feature is useful for parents to protect the children (highest weight of Effectiveness is 0.3652). However, the lower level is Safety (0.1332) and found several finding; i.e., there has been no change in the mindset of parents to be wise in considering or selective of content on the internet by not just looking at the cover alone. For example, there is a cartoon of children which turned out to contain images of pornography. Very few parents pay attention to what children watch. Sometimes parents are embarrassed to discuss or get involved with children when they surf the internet[6]. Therefore, the requirement of education for children and parents thus they can consider, choose, and take decisions in viewing the positive and negative effect of using the Internet itself. Its need the right strategy[5] that need do for further research.

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