Elementary School Learning Media Application Based on Android with Customer Satisfaction Index Method

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Abstract. The objective of this research is to understand customer satisfaction, which is an assessment of a product or service that aims to improve the quality and service of a product or services. In this study the measurement method used is the Customer Satisfaction Index (CSI) method. This method is used to determine how much the level of user satisfaction with learning media applications. The result shows that the calculation of the level of customer satisfaction based on Tangibles, Reliability, Responsiveness, Assurance, and Empathy. The percentage value obtained is based on these five attributes using the Likert Scale, which is a scale of 1-5. Based on the results of the research conducted, the satisfaction of use in the application shows the criteria of satisfaction. This calculation is useful to find out the quality of this learning application. By knowing the value of satisfaction, it can be concluded that this application can help the learning process of children, however this application still not forgetting some suggestions from respondents to evaluate and improve the application to be even better.

1. Introduction

Customer satisfaction is one factor or measure of the success of service delivery or product quality. It also helps to reveal the desires and preferences of customers [1]. A good image of service quality is not based on the point of view or perception of the service provider or product, but based on the customer's point of view or perception. Customers who enjoy services or products determine the quality of service. Customer perception of service quality is a comprehensive assessment of the superiority of a service or product.

Various inventions in the field of technology have changed the human perspective on global fields, including education field. The influence of technology in education increasingly encourages efforts to renew the use of technology in the learning process as one way to improve the quality of education [2,3]. The quality of good education is certainly supported by a good learning component. Learning components include teachers, students, materials, media, methods and the environment in which the learning process takes place. A large number of learning resource centers for students are available. As the result, teacher is no longer the only source of information for learning.

Android-based learning media is one of the educational services that allows assisting in the learning process by using a media that is a smartphone. The main function of learning media is as a teaching support to motivate and influence the learning environment created by the teacher. Learning media consists of various types. One type of learning media commonly used in schools is printed learning
media in the form of books. The media is widely used because it is considered practical, can adjust based on student abilities and is easily distributed, but this media has limitations that cannot display certain objects such as sound, moving images, and the appearance is also monotonous because it is only text. Textbooks sometimes cannot be used all the time and are considered boring by some students [4]. The smartphone has become extremely popular, recently [5]. Over 334 million smartphones were shipped worldwide in Q1 2017 according to the IDC report, and smartphones running Android dominate the mobile market with an 85.0% [6]. Android development is very rapid and widely used by many people, so the development of learning media using Android is very helpful. This can be seen especially in elementary school children, in general, they currently have mobile phones, smartphones, and tablets as a tool for playing games as well as a medium to seek knowledge and learning, this is a great initial potential to become the main capital for achieving achievement learning, besides children at this time also on average have been "mobile" (communicating practically, easily and quickly) and the mobile media has become one of the children's play and learning partners. Parents usually have difficulty guiding learning, so they choose to call a private teacher for their child. But in this way, it also does not help increase children's learning interest, because the learning media used are also like those in their school. This android-based learning media can be used anywhere, not knowing the place and time. And this android-based application is used to increase learning motivation and cognitive achievement. For students learning motivation can foster the spirit of learning so that students are motivated to do the act of learning [7]. Because when this media is used continuously so that the material can also be embedded in the child's memory.

This study used the measurement method of the Customer Satisfaction Index (CSI). By determining the scale of importance and satisfaction level. Measuring customer satisfaction is very useful in order to evaluate with competitors and end users, as well as find which parts need improvement. The benefits of customer satisfaction analysis, namely as a policy decision-making tool to improve performance, quality, as well as achieve one of the predetermined missions to gain trust and loyalty through customer satisfaction.

2. Method
This research was conducted to determine the index of user satisfaction in Learning Media Applications using the Customer Satisfaction Index (CSI) method. Data collection of this study is based on primary data which is the result of questionnaires distributed to 20 respondents. Questionnaires are filled based on the level of importance and level of satisfaction. For the assessment on the questionnaire using a Likert Scale [8] with a value of 1-5 as follows:

2.1 Determining the Scale of Interest
As a guideline for assessing the level of importance of service quality using a Likert scale with grades 1-5. The Likert scale of interest can be seen in Table 1.

| Value | Information          |
|-------|----------------------|
| 1     | Very Unimportant     |
| 2     | Unimportant          |
| 3     | Enough Important     |
| 4     | Important            |
| 5     | Very Important       |
2.2 Determining the Satisfaction Level Scale

As a guideline for assessing the level of satisfaction of service quality by using a Likert scale with grades 1-5. The Likert scale level of satisfaction can be seen in Table 2.

| Value | Information       |
|-------|-------------------|
| 1     | Very Dissatisfied |
| 2     | Dissatisfied      |
| 3     | Enough Satisfied  |
| 4     | Satisfied         |
| 5     | Very Satisfied    |

2.3 Determine the Question Indicator

The design of the questionnaire given to parents uses the SERVQUAL model. SERVQUAL model has been applied to identify and classify the needs of customers [9]. SERVQUAL model which consists of five dimensions namely Tangibles, Reliability, Responsiveness, Assurance and Empathy [10]. Question indicators can be seen in Table 3.

| Dimension  | Code | Question                                                                 |
|------------|------|--------------------------------------------------------------------------|
| Tangibles  | A1   | Attractive application design                                            |
|            | A2   | Attractive app icon design                                               |
|            | A3   | Background display according to the learning theme                       |
|            | A4   | Fonts are easy to read                                                   |
| Reliability| A5   | Switch between pages to the next page quickly                            |
|            | A6   | Learning material that is displayed clearly and completely                |
|            | A7   | Easy application to use                                                  |
|            | A8   | The button response is perfect                                           |
| Responsiveness| A9 | Learning material is easy to understand                                  |
|            | A10  | Learning practice questions are easy to understand                       |
|            | A11  | Explanation of help using the application can be understood              |
|            | A12  | The calculation of the results of the workmanship in the practice        |
|            |      | questions is understandable                                              |
|            | A13  | Applications can help the learning process                               |
| Assurance  | A14  | The application has a positive impact                                     |
|            | A15  | The application adds interest in learning                                |
|            | A16  | The application is always used for learning                              |
|            | A17  | The application provides information about the application               |
|            | A18  | The application provides answers to the correct practice questions       |
| Empathy    | A19  | The application gives an assessment of the score on the results of the   |
|            |      | practice questions                                                       |
|            | A20  | The application provides an explanation of the use of the application    |

The following are the steps to calculate the Customer Satisfaction Index (CSI) [11]:

1. Determine Mean Importance Score (MIS) and Mean Satisfaction Score (MSS)

   This value comes from the average importance of each attribute and the average satisfaction of each attribute [12].

   \[
   MIS = \frac{\sum_{i=1}^{n} Y_i}{n} \tag{1}
   \]
Information:
\[ n = \text{Number of Respondents} \]
\[ Yi = \text{Value of Interest Y Attribute to} \ i \]

\[ MSS = \frac{\sum_{i=1}^{n} Xi}{n} \]  \hspace{1cm} (2)

Information:
\[ n = \text{Number of Respondents} \]
\[ Xi = \text{Value of Satisfaction X Attribute to} \ i \]

2. Calculating Weight Factors (WF)
This value is the percentage value of the Mean Importance Score (MIS) per attribute against the Mean Importance Score (MIS) of all attributes [12].

\[ WF = \frac{\text{MIS}_i}{\sum_{i=1}^{p} \text{MIS}_i} \times 100\% \]  \hspace{1cm} (3)

Information:
\[ \text{MIS}_i = \text{Mean Importance Score} \]
\[ p = \text{Number of Attributes} \]
\[ i = \text{Attribute to} - 1 \]

3. Calculating Weight Score (WS)
This value is the multiplication between Weight Factors (WF) and the average Mean Satisfaction Score (MSS) [12].

\[ WS = WF_i \times MSS_i \]  \hspace{1cm} (4)

4. Calculating Customer Satisfaction Index (CSI) [11].

\[ CSI = \frac{T}{5Y} \times 100\% \]  \hspace{1cm} (5)

Information:
\[ T = \text{Total Weight Score (WS)} \]
\[ 5 = \text{Maximum Value on the Likert Scale} \]
\[ Y = \text{Total Mean Importance Score (MIS)} \]

The level of respondents' satisfaction as a whole can be seen from the respondents' satisfaction level criteria, satisfaction level criteria can be seen in Table 4.

| Table 4. Satisfaction Level Criteria |
|--------------------------------------|
| **Value (CSI) %** | **Information** |
|-------------------|----------------|
| 81% - 100%        | Very Satisfied |
| 66% - 80.99%      | Satisfied      |
| 51% - 65.99%      | Enough Satisfied |
| 35% - 50.99%      | Less Satisfied |
| 0 % - 34.99%      | Dissatisfied   |
3. Results and Discussion

To implement the Customer Satisfaction Index (CSI) method, the questionnaire would be filled out by parents and produce data in the form of importance and satisfaction. After getting the questionnaire results from 20 respondents who have filled out the questionnaire, then it would produce a data recapitulation. Data recapitulation can be seen in Figure 1 and Figure 2.

![Figure 1. Recapitulation of Importance Level Data](image)

![Figure 2. Recapitulation of Satisfaction Level Data](image)

Based on Figure 1, the data is obtained from the respondent’s questionnaire and the respondent’s assessment is calculated to be a number using the Likert scale. The data are grouped into recapitulation data based on the level of importance.

Based on Figure 2, the data is obtained from the respondent’s questionnaire and the respondent’s assessment is calculated to be a number using the Likert scale. The data are grouped into
recapitulation data based on the level of satisfaction. If you have got the data as in figure 1 and figure 2 which has been filled using a Likert scale with a value of 1-5, then it determines the Mean Importance Score (MIS) and Mean Satisfaction Score (MSS). This value comes from the average importance of each attribute and the average satisfaction of each attribute [12]. Average value can be seen in Table 5.

| Attribute Number | Mean Importance Score (MIS) | Mean Satisfaction Score (MSS) |
|------------------|-----------------------------|------------------------------|
| A1               | 4.65                        | 4.3                          |
| A2               | 4.85                        | 2.35                         |
| A3               | 4.75                        | 3.6                          |
| A4               | 4.8                         | 4.45                         |
| A5               | 4.5                         | 4.1                          |
| A6               | 4.75                        | 2.35                         |
| A7               | 3.25                        | 4.25                         |
| A8               | 4.9                         | 4.15                         |
| A9               | 4.75                        | 2.85                         |
| A10              | 4.7                         | 3.9                          |
| A11              | 4.75                        | 4.6                          |
| A12              | 4.8                         | 4                            |
| A13              | 4.85                        | 4.5                          |
| A14              | 4.85                        | 4.3                          |
| A15              | 4.9                         | 3.7                          |
| A16              | 4.7                         | 3.9                          |
| A17              | 4.9                         | 2.5                          |
| A18              | 4.8                         | 4.1                          |
| A19              | 4.7                         | 3.8                          |
| A20              | 4.75                        | 3.7                          |
| Total            | 93.9                        | 75.4                         |

After getting the value of Mean Importance Score (MIS) and Mean Satisfaction Score (MSS), determine the Weight Factors (WF). This value is the percentage value of the Mean Importance Score (MIS) per attribute against the Mean Importance Score (MIS) of all attributes. The value of weight factors can be seen in Table 6.

| Attribute Number | Mean Importance Score (MIS) | Weight Factors (WF) |
|------------------|-----------------------------|---------------------|
| A1               | 4.65                        | 4.95                |
| A2               | 4.85                        | 5.17                |
| A3               | 4.75                        | 5.06                |
| A4               | 4.8                         | 5.11                |
| A5               | 4.5                         | 4.79                |
| A6               | 4.75                        | 5.06                |
| A7               | 3.25                        | 3.46                |
| A8               | 4.9                         | 5.22                |
If you have obtained the Weight Factors (WF) value, then it will be followed by determining the Weight Score (WS). This value is the multiplication between Weight Factors (WF) and the average level of satisfaction (MSS). The value of weight score can be seen in Table 7.

### Table 7. Weight Score (WS)

| Attribute Number | Weight Factors (WF) % | Mean Satisfaction Score (MSS) | Weight Score (WS) |
|------------------|-----------------------|-------------------------------|-------------------|
| A1               | 4.95                  | 4.3                           | 21.29             |
| A2               | 5.17                  | 2.35                          | 12.14             |
| A3               | 5.06                  | 3.6                           | 18.21             |
| A4               | 5.11                  | 4.45                          | 22.75             |
| A5               | 4.79                  | 4.1                           | 19.65             |
| A6               | 5.06                  | 2.35                          | 11.89             |
| A7               | 3.46                  | 4.25                          | 14.71             |
| A8               | 5.22                  | 4.15                          | 21.66             |
| A9               | 5.06                  | 2.85                          | 14.42             |
| A10              | 5.01                  | 3.9                           | 19.52             |
| A11              | 5.06                  | 4.6                           | 23.27             |
| A12              | 5.11                  | 4                            | 20.45             |
| A13              | 5.17                  | 4.5                           | 23.24             |
| A14              | 5.17                  | 4.3                           | 22.21             |
| A15              | 5.22                  | 3.7                           | 19.31             |
| A16              | 5.01                  | 3.9                           | 19.52             |
| A17              | 5.22                  | 2.5                           | 13.05             |
| A18              | 5.11                  | 4.1                           | 20.96             |
| A19              | 5.01                  | 3.8                           | 19.02             |
| A20              | 5.06                  | 3.7                           | 18.72             |
| **Total**        | **100.00**            | **75.4**                      | **375.97**        |

After getting the Weight Score (WS) value, the last step is to calculate the Customer Satisfaction Index (CSI). The Customer Satisfaction Index (CSI) value is obtained by using the equation:

\[
CSI = \frac{375.97}{5 \times 93.9} \times 100\% = 80.07\%
\]
Based on the calculation of the Customer Satisfaction Index (CSI) above, it can be seen that the respondent's satisfaction level is 80.07% and the value is in the range of values of 66% - 80.99%, which means the respondents are satisfied for the use of the learning media application [13]. Previous research using website-based applications showed the level of satisfaction in the criteria was very satisfied, while this study using an android-based application and shows the level of satisfaction in the criteria of satisfied. By looking at the differences in these criteria, the Android-based learning application still needs to be improved so that it does not compete with other types of learning applications [14].

4. Conclusion
The level of user satisfaction of learning media applications is calculated using the Customer Satisfaction Index (CSI) by looking at 5 attributes, namely, Tangibles, Reliability, Responsiveness, Assurance, and Empathy. The results show a value of 80.07% and the value is in the criteria of satisfaction. It can be concluded that learning application users are satisfied with the application performance. The limitations of this study are only using the Customer Satisfaction Index method. Although only using one method, to improve the performance and quality of this application, it can be better seen from the suggestions on the respondent's questionnaire.

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References
[1] Paz, A., de la Fuente-Mella, H., Singh, A., Conover, R., and Monteiro, H. (2016). Highway expenditures and associated customer satisfaction: A case study. Mathematical Problems in Engineering.
[2] Alhabahba, M. M., Mahfoodh, O. H. A., Pandian, A., Mohammad, Y. M., Ahmed, E. W., Albdour, A., and Al Bazar, H. (2014). Check This Word Out! Exploring the Factors That Affect Students’ Vocabulary Learning Using Smartphones via Partial Least Squares. Education Research International.
[3] Shorfuzzaman, M., and Alhussein, M. (2016). Modeling learners’ readiness to adopt mobile learning: A perspective from a GCC higher education institution. Mobile information systems.
[4] Saputra, M., Abidin, T. F., Ansari, B. I., and Hidayat, M. (2018, September). The feasibility of an Android-based pocketbook as mathematics learning media in senior high school. In Journal of Physics: Conference Series (Vol. 1088, No. 1, p. 012056). IOP Publishing.
[5] Ma, C., Zhu, Q., Wu, S., and Liu, B. (2016). Representation Learning from Time Labelled Heterogeneous Data for Mobile Crowdsensing. Mobile Information Systems.
[6] Ren, B., Liu, C., Cheng, B., Guo, J., and Chen, J. (2018). MobiSentry: Towards Easy and Effective Detection of Android Malware on Smartphones. Mobile Information Systems.
[7] Kurniawan, D. T., Suhandi, A., Kaniawati, J., and Rusdiana, D. (2017, February). The Analysis of Learning Obstacle and Students Learning Motivation of Prospective Math Teachers in Basic Physics Class. In Journal of Physics: Conference Series (Vol. 812, No. 1, p. 012026). IOP Publishing.
[8] Biondich, A. S., and Joslin, J. D. (2016). Quantifying the “Slosh Stomach”: A Novel Tool for Assessment of Exercise-Associated Gastroparesis Symptoms in Endurance Athletes. Journal of Sports Medicine.
[9] Kargari, M. (2018). Ranking of Performance Assessment Measures at Tehran Hotel by Combining DEMATEL, ANP, and SERVQUAL Models under Fuzzy Condition. Mathematical Problems in Engineering.
[10] Gedeon, S. A. (2017). Measuring student transformation in entrepreneurship education programs. Education Research International.

[11] Permatasari, D. (2017, June). The customer satisfaction towards the service quality of Tawang Alun Malang-Banyuwangi Train. In IOP Conference Series: Earth and Environmental Science (Vol. 70, No. 1, p. 012009). IOP Publishing.

[12] Suroto, S., Nindiani, A., and Purba, H. H. (2016). Students’ satisfaction on academic services in higher education using importance-performance analysis. ComTech: Computer, Mathematics and Engineering Applications, 8(1), 37-43.

[13] Buamona, D. M. (2017, June). Societal perception toward transportation modes based on online (Go-Jek) in Malang City. In IOP Conference Series: Earth and Environmental Science (Vol. 70, No. 1, p. 012007). IOP Publishing.

[14] Sinnun, A. (2017). Analisis Kepuasan Pengguna LMS Berbasis Web Dengan Metode Servqual, IPA dan CSI. Jurnal Informatika, 4(1).