The factors influencing digital literacy of vocational high school teachers in Yogyakarta

K Warno
Study Program of Fashion Engineering Education, Faculty of Engineering, Universitas Negeri Yogyakarta
*kusminarkowarno@uny.ac.id

Abstract. The purpose of this study is to reveal the condition of teachers’ digital literacy and the effect of the achievement motivation towards digital literacy among Tourism vocational teachers in Yogyakarta based on age generation, i.e. the generation differences of Baby Boomers, X and Y. This research belongs to ex-post-facto with a quantitative approach. The research subjects were 130 teachers consisting of teachers from state tourism vocational schools in Yogyakarta. The results showed that the majority of digital literacy among tourism vocational teachers can be categorized as medium and the variable of achievement motivation plays a significant influence on digital literacy. Moreover, there was a significant influence from the facilities that were used by the teachers towards their digital literacy. Also, there were differences in teachers’ digital literacy among teachers who were born in the baby boomers generation, X and Y generation. It means that the variable age generation of teachers can improve the digital literacy skills of vocational school teachers in the field of tourism.

1. Introduction
Today, all people can gain a positive impact of ICT in which all things can be done quickly and effectively with no limitation of space and time. Another impact is on the learning orientation shift from guided outside into self-guided which is really experienced by teachers, especially those who are in the baby boomers and X generation. Teachers who are included in the X generation do not have any experience of technological advances during their learning process but now all things have been connected with the internet.

The low teachers’ ability on digital literacy has resulted in less appreciative students during classroom learning [1]. For this reason, the role of teachers in the digital age is very important. They must have high achievement motivation in mastering ICT so they are not left behind by current generations (students). Moreover, the current learning should be centered on students (student-centered learning) of which the students are actively involved to improve and develop their critical thinking, problem-solving skills, communication skills, good habits and conceptual thinking based on the current era.

To optimize learning, responsive human resources are needed to develop digital, especially the role of teachers who have a literate spirit, as well as students who are actively participated in learning. [2]
mention that ICT-based learning has many advantages, in case of its effectiveness, broad access, and
interesting features to support learning objectives. To enhance digital literacy, a teacher must have high
achievement motivation. This motivation is an attitude that must be possessed by a teacher related to
how to do things better, faster, more efficient than the previous. It is also one way to encourage teachers
to always try to learn new knowledge that keeps growing in the digital era as it is today [3]. The concept
of achievement motivation was firstly formulated by Murray. Murray uses the term need for achievement
as a desire or tendency to do something difficult as quickly as possible [4]. According to Murray
achievement motivation is the driving force to achieve the highest level of learning achievement
according to people's own expectations [5].

Howe and Strauss defines a generation as a group of all people born during a span of twenty years or
about the length of a phase from childhood, young adulthood, middle age and old age. The age
generation of every teacher and student also has an important role in mastering Digital ICT [6]. It can be
seen that the age generation consists of baby boomers, X generation, and Y generation. The baby
boomers generation is the generation born between 1946 and 1964 or the age of 52 to 70 years in
contrast to the X generation born in 1965 to 1981 or 35 to 51, it is also different from Generation Y who
was born in 1982 to 1994 who is currently aged 22 to 34 or called the millennial generation. Here, the
age range between teacher and student can be a difficult problem to overcome during the learning
process.

There are several obstacles experienced by Tourism vocational teachers in Yogyakarta for developing
digital ICT, such as the lack of teacher knowledge of digital ICT, lack of teacher achievement
motivation in learning digital ICT, low adaptation, and inadequate learning facilities on digital ICT.
Related to the above problems, it is beneficial to clarify whether there is a significant influence from the
achievement motivation moderated by the baby boomers generation, X and Y, towards digital ICT
literacy that must be mastered by Tourism vocational teachers in Yogyakarta. By having this research,
teachers are expected to realize the importance of technological awareness during the learning process as
the demands of schools curriculum that require teachers and students to master digital ICT.

2. Method
2.1. Research Methods
This study employed a quantitative approach with ex-post-facto methods. The quantitative approach used
to examine the population or a particular sample that aims to find out how much influence between the
independent variable with the dependent variable that has occurred [7].

2.2. Respondent
The population in this study were all Tourism vocational teachers in Yogyakarta that were randomly
selected from the expertise of Clothing and Makeup department. The sample determination in this study
was based on the Isaac and Michael tables by taking the error rate of 5%. The sampling in this study used
proportional random sampling from the population of 130 respondents.

2.3. Data Analysis
The data collection method in this study was using a questionnaire. The assessment technique in this
study used a Likert scale on each variable X1, Y (achievement motivation variable, and digital ICT
literacy) with four answer: "Never / Disagree" = 1, "Sometimes / Disagree" = 2, "Frequently / Agree" = 3
and "Always / Very Agree" = 4. Meanwhile, the variable Z (generation) was obtained from the teacher
identity data that was filled in the provided identity column.

The obtained scores were then converted based on the formula developed by Mardapi [8] that can be
seen in Table 1.
Table 1. Variable categorization

| Scores | Tendency | Category       |
|--------|----------|----------------|
| 4      | X ≥ Mi + 1 Sdi | Very High      |
| 3      | Mi + 1 Sdi > X ≥ Mi | High         |
| 2      | Mi > X ≥ Mi – 1 Sdi | Moderate     |
| 1      | X < Mi – 1 Sdi   | Low           |

Where: X = teachers’ score from variables, X, Mi = ideal mean, Sdi = standard deviation

The influence of achievement motivation (X1) on the digital ICT literacy of Tourism vocational teachers in Yogyakarta, and infrastructure (X2) on the digital ICT literacy. Both hypotheses were tested using simple regression techniques. The simple regression equation was calculated manually referring to Sugiyono [9] as follows equation (1):

\[ Y = a + bX \]  

(1)

Where Y = dependent variable, a = constant (value of Y if X = 0), b = Regression Coefficient, X = Independent Variable

To determine the effect of achievement motivation (X1) and infrastructure (X2), on the digital ICT literacy among Tourism vocational high school teachers in Yogyakarta (Y), multiple regression analysis was used with the type of ANOVA, i.e One-way ANOVA or ANOVA one path, because only pay attention to one variable. The average difference with the ANOVA test can be written as follows equation (2):

\[ F = \frac{RJK_a}{RJK_i} \]  

(2)

Where \( RJK_a \): intergroup variance (average number of between squares), \( RJK_i \): Variance of sample selection error (average number of inter squares) [9]

Hypothesis testing was done by using a significance level \( \alpha = 0.5 \) with the following testing criteria (3):

\[ F_{\text{count}} \leq F_{\text{table}}, \text{so } H_0 \text{ is accepted dan } H_a \text{ is rejected} \]  

\[ F_{\text{count}} > F_{\text{table}}, \text{so } H_0 \text{ is accepted dan } H_a \text{ is rejected} \]  

(3)

In the next hypothesis using the MANOVA test, the MANOVA was tested whether there were significant differences in some dependent variables which more than one independent variable.

3. Results

The variables used in this study were achievement motivation (X1), teacher-age generation (Z), and digital ICT literacy (Y). In Table 2, it was explained descriptively from each of these variables.

Table 2. The Results of Descriptive Research Variable

| Var. | Min | Max | Std.Dev | Mean |
|------|-----|-----|---------|------|
| X1   | 18  | 45  | 5,85    | 30,71|
| X2   | 27  | 53  | 5,90    | 37,38|
| Z    | 29  | 60  | 6,09    | 50,98|
| Y    | 45  | 78  | 8,25    | 58,36|
Data on the achievement motivation variables in this study were obtained through a closed questionnaire with a total of 12 question items. The scoring used in the questionnaire was 1 to 4, so the achievement motivation variable had a score range of 24 to 35. The following Table 3 showed the scores distribution and their frequency for the teacher achievement motivation.

**Table 3. Frequency Distribution of Achievement Motivation Categories (X₁)**

| Category | Score Interval | Frequency | Percentage |
|----------|----------------|-----------|------------|
| High     | 36-48          | 24        | 18.5%      |
| Moderate | 24-35          | 91        | 70.0%      |
| Low      | 12-23          | 15        | 11.5%      |
| Total    |                | 130       | 100.0%     |

The results of the teacher achievement motivation category showed that the majority of teacher motivation can be categorized as medium (70.0%). The majority of teacher achievement motivation ranged from 24 to 35. It shows that in general teacher achievement motivation should be developed. The following Table 4 forms the frequency distribution and of the scores for the baby boomers, X and Y generation.

**Table 4. Frequency distribution of teacher age generation category (Z)**

| Category            | Age Interval | Frequency | Percentage |
|---------------------|--------------|-----------|------------|
| Baby boomers        | 52-70 th     | 57        | 43.8%      |
| X Generation        | 35-51 th     | 51        | 39.2%      |
| Y Generation        | 22-34 th     | 22        | 16.9%      |
| Total               |              | 130       | 100.0%     |

The results of the baby boomers, X and generation Y factors indicated the majority of the generation of teachers who were in 52-70 years old or in the baby boomers category was 43.8%. The data on the infrastructure variables in this study were obtained through a closed questionnaire with a total of 22 question items. The scoring used in the questionnaire was 1 to 4. Based on the score of the Digital ICT Literacy variable, it had a score range from 31 to 124. The following is Table 5 shows the score distribution and frequency for the Digital ICT literacy variable.

**Table 5. Frequency distribution of ICT digital literacy category**

| Category | Score Interval | Frequency | Percentage |
|----------|----------------|-----------|------------|
| High     | 93-124         | 26        | 20%        |
| Moderate | 62-92          | 104       | 80%        |
| Low      | 31-61          | 0         | 0.0%       |
| Total    |                | 130       | 100%       |

The results of the teacher's digital ICT literacy category indicated that the majority of teacher's digital ICT literacy fell into the medium category (80.0%). It shows that the majority of teacher's digital ICT literacy ranged from grades 62 to 92. It means that in general the teacher's digital ICT literacy still needs to be improved.

The variables tested for normality were the achievement motivation (baby boomers generation X, generation X and Y generation of Tourism vocational teachers in Yogyakarta (Z), and digital ICT literacy (Y). The data normality test in this study was carried out using the One-Sample Kolmogorov
Smirnov method. The variables were normally distributed if the significance value was above 0.05 and the statistical z (Kolmogorov-Smirnov z) was below the z table. The normality test can also be carried out by the graph method where data are normally distributed if the symmetrical histogram and the normal graph distribution of data of pp plot close or follow the diagonal lines.

| Var. | Kolmogorov Smirnov Z | Sig.  | Exp.  |
|------|----------------------|-------|-------|
| X1   | 1.309                | 0.065 | Normal|
| Z    | 1.333                | 0.057 | Normal|
| Y    | 1.154                | 0.139 | Normal|

The normality test results in Table 6 showed that the variables used in this study were normally distributed. It can be seen from the statistical z value below the z table and the significance value above 0.05.

![Histogram normality test](image1)

![Normal P-P normality test plot](image2)

The normality test based on the histogram (Figure 1) obtained graphs form symmetrical graphs. P-P The plot in Figure 2 was obtained by the distribution of data following a diagonal line. Based on the histogram chart and the normal P-P plot, it can be concluded that the research results were normally distributed. In this study, the data linearity test was performed with the variance test (F test). The variable is considered Linear if it has an F value below the F table or the significance value of the deviation linearity is above 0.05.

| Var. Independen | Var. Dependen | F count | Sig.  | Exp.  |
|-----------------|---------------|---------|-------|-------|
| X1              | Y             | 0.917   | 0.579 | Linear|

The results of the linearity test on each hypothesis indicated that each independent variable had $F_{\text{count}}$ value below the $F_{\text{table}}$ and the significance value was above 0.05. It can be concluded that the independent variable is linear towards the dependent variable. Table 8 shows the multicollinearity test results of the regression model of the research results.

| Var. Independen | Var. Dependen | VIF  | TOL   | Exp.  |
|-----------------|---------------|------|-------|-------|
| X1              | Y             | 802  | 1.247 | Non-Multiko-linieritas |
The results of the multicollinearity test statistics above indicated that between independent variables did not have a significant relationship. It can be seen from VIF value of each variable in the three hypotheses below 10 and the tolerance value above 0.1 so that it can be said that the regression model formed did not have multicollinearity.

The regression model that does not contain heteroscedasticity if the significance value is above 0.05 and based on scatterplots (there is no pattern of diffuse points above and below the number 0 on the Y-axis). Table 9 is the results of the heteroscedasticity regression model of the results of the study [10]

| Var. Independent | Var. Dependent | t count | Sign. | Exp. |
|------------------|----------------|---------|-------|------|
| X₁               | Y              | 0,485   | 0,628 | Non Heteroskedasticitas |

Heteroscedasticity test results on each hypothesis showed that each independent variable had a significant value above 0.05. It means that the regression model in this study does not have heteroscedasticity. That is, the data from this study have homogeneous data. The following are the heteroscedasticity test results based on scatterplot charts.

![Figure 3. Scatterplot of heteroscedasticity test](image)

The scatterplot image in Figure 3 shows that the overall graph from the research variables. The results of the graph have data distribution that does not form certain patterns. The data spread above and below the 0 lines on the Y axis, so graphically it can be said that the regression model does not have heteroscedasticity meaning that the results of this research are homogeneous.

The results of hypothesis testing in this study consisted of the results of simple regression analysis and multiple regression analysis. In the hypothesis test consisted of the F test (simultaneous test on multiple regression), t-test (partial test), and the coefficient of determination (R Square) consisting of effective and relative contributions.

| Var. Standardized Coefficients Beta | t count | Sig. | Exp. |
|------------------------------------|---------|------|------|
| X₁                                 | 0,394   | 5,151| 0,000| Significant |

The coefficient value of 0.394 can be interpreted as a positive influence of achievement motivation on digital ICT literacy. The higher the motivation of teacher achievement, the higher digital ICT literacy will be. The value of 0.394 can be interpreted as an escalation of 0.394 for each increase in motivation to achieve one-unit achievement. The coefficient of determination (effective contribution) of the regression results was 0.377 so that it can be interpreted that teacher generation variables affected digital ICT
literacy by 37.7% and there were 62.3% of other variables that affected teachers’ ICT literacy. The effect of achievement motivation (X1) simultaneously on digital ICT literacy (Y). The results of hypothesis testing $X_1 \rightarrow Y$ is presented in Table 11.

| Variable  | Standardized Coefficients Beta | F count | Sig. | Exp. |
|-----------|-------------------------------|---------|------|------|
| $X_1$     | 0.394                         | 42.882  | 0.000| Significant |
| Constant  | = 22.875                      |         |      |      |

Based on The $F_{count}$ value of 42.882 and the significance of 0.000, it can be seen that the $F$ count was above the $F$ table and the significance was less than 0.05. It means that there is a significant mutual effect from the achievement motivation and infrastructure variables on digital ICT literacy. The magnitude of the coefficient of determination was 0.403 so it can be interpreted that the achievement motivation variable affects digital ICT literacy by 40.3% and the remaining 59.7% was influenced by other variables explained in the model. The results of hypothesis testing $X_1 \rightarrow Z \rightarrow Y$ is presented in Table 12.

| Variable  | Mean Square | $F_{count}$ | Sig. | Exp. |
|-----------|-------------|-------------|------|------|
| $X_1$     | $\rightarrow$ | 184,927     | 5.803| 0.004| Significant |
| $Y$       | $\rightarrow$ | 634,660     | 9.634| 0.000| Significant |

Based on the calculation results above, it can be seen that there is an influence from the achievement motivation (X1), moderated by the generation of teachers (Z) on digital ICT literacy (Y). This is evidenced by the moderation variable value which had a significance value of $b = 0.05$. This moderation variable is the result of the Manova test of the independent variables on the moderating variable. R square results were 0.084; 0.050 and 0.132 which can be said as a positive influence. It means with the baby boomers generation variable, generation X and generation Y can improve the ICT literacy skills of teachers.

Based on research that has been done regarding the factors that affect the digital ICT literacy of Tourism vocational school teachers in Yogyakarta, several points can be discussed as follows. The condition of digital ICT literacy among teachers in Tourism Vocational schools in Yogyakarta is not optimum yet. It indicates a lack of motivation to excel teachers in using digital ICT devices. The results of the digital ICT literacy category of the majority of vocational school teachers in the tourism field in Yogyakarta are in the medium category (80.0%). This means that in general teacher digital ICT literacy still needs to be improved. There is a significant influence of teacher achievement motivation factors on the fulfillment of digital ICT literacy. The motivational variables have a positive effect on teacher's digital ICT literacy with the significance value of achievement motivation variable that is 0,000 and $t_{count}$ value of 5.151 and the coefficient value of 0.394 that can be interpreted as a positive effect of achievement motivation on digital ICT literacy. The higher the motivation of teacher achievement, the higher ICT literacy will be.
There is a significant influence between achievement motivation on digital ICT literacy of Tourism vocational high school teachers in Yogyakarta. There is an influence of achievement motivation, which is moderated by the baby boomers, X generation and Y generation on digital ICT literacy (Y). The result of the moderation coefficient is positive or to have a positive effect. That is, the existence of the variable age generation of teachers can improve teachers’ ICT literacy. It is proven by the moderation variable value that has a significance value of $b = \text{below 0.05}$ with a moderation variable value that has a significance value of $b = \text{below 0.05}$. The R square results show the number 0.084; 0.050 and 0.132, respectively which can be said to be a positive influence. That is, the baby boomers generation variable, generation X and generation Y can improve the ICT literacy skills of teachers.

4. Conclusion

Based on research that has been done regarding the factors that affect the digital ICT literacy of Tourism vocational school teachers in Yogyakarta, it indicates that teachers’ digital ICT literacy still needs to be improved. There is a significant influence of teacher achievement motivation factors on the fulfillment of digital ICT literacy of vocational school teachers in the tourism field in Yogyakarta.

There is a significant effect of simultaneous achievement motivation on digital ICT literacy of tourism vocational school teachers in Yogyakarta. There is a difference in digital ICT literacy between baby boomers, X and Y generations in Tourism vocational teachers in Yogyakarta. There is an influence of achievement motivation, which is moderated by the baby boomers, X generation and Y generation on digital ICT literacy (Y). That is, the baby boomers generation variable, X generation, and Y generation can improve the ICT literacy skills of teachers.

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