Enhancing Learning Engagement on Minangkabau Traditional Food through Gamified Mobile Quiz

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Abstract. Some ethnic groups are reported not only dealing with the deskilling problems related to domestic cooking proficiency but starting to lose the traditional food culture due to the impairment of old generation of bequeathing the knowledge of traditional food to the young generations. Nevertheless, teaching traditional knowledge is challenging due to the characteristics of the youth nowadays as digital natives that always adhere to modern technology instead of traditional one. Hence, there is a need to find an approach to teaching implementation which engages the youth in learning Minangkabau traditional food. This study aims to propose gamification as an approach for enhancing learning among young generation in Minangkabau. It focuses on the learning of Minangkabau traditional food using gamification elements in a mobile quiz. This study used methodology that was a part of quantitative, particularly a survey technique using a questionnaire to collect data to measure level of engagement. Finally, we examined the level of user engagement using modified Technology Engagement Model (TEM). Structural Equation Modelling was used to validate the variables which influenced the engagement such as Individual Expectation (IE), Facility Environment (FE), Social Environment (SE), Technology Engagement (TE), and Trust. A total of 160 participants between 17-25 years old were randomly assigned to contribute to this study. The results indicate that gamification which implemented in the mobile quiz application provides positive effects that enhance user engagement. Usefulness of fragmented learning, peer support, and trust were found to be the most significant factors to enhance the gamified quiz engagement.

Keywords: Culture, Education, Food, Gamification, Knowledge, Minangkabau, Mobile, TEM

1. Introduction
Minangkabau traditional food has been described as one of the most popular food in Indonesia even in Southeast Asia [1]. They include food produced in a conventional way, which have been consumed by local and regional people. As circumstances are gradually changing, people change into a more urban and modern life that contributes to the eating habits of the community[2]. Various factors that can affect traditional food consumption such as changes in lifestyle, climate changes [3], socio-economic status [4], incessant promotion and the availability of foreign food on a large scale, and people's knowledge of traditional food itself.

Knowledge of food especially traditional food may refer to the type of food, ingredients used, cooking procedure, or where the food comes from. Knowledge of traditional food among young people is an important thing that must be considered in the effort of preservation of traditional food in its position as a part of the culture. However, in West Sumatra (Minangkabau area) especially the younger
generation has gradually ignored the practice of the traditional food. Many of them may know the
traditional food but may not know the way of preparing them nor where they come from. Some ethnic
groups are reported not only dealing with the deskilling problems related to domestic cooking
proficiency but starting to lose the traditional food culture due to the impairment of old generation of
bequeathing the knowledge of traditional food to the young generations. Therefore, Minangese has to
disseminate the knowledge to engage the younger generation who may no longer be interested in the
traditional food.

Substantial efforts have been made to preserve the tradition of Minangkabau food including by
knowledge transfer to the younger generation[5]. Nevertheless, teaching traditional knowledge is
challenging due to the characteristics of the youth nowadays as digital natives that always adhere to
modern technology instead of traditional one[6]. Hence, an approach to teaching implementation which
courage the youth to acquire knowledge of Minangkabau traditional food is required.

Gamified approaches to engage people by using game concepts in non-game contexts are widely
used and become popular across many fields. Gamification is adopted for a variety of purposes,
including education purposes. Gamification becomes an emerging trend due to the assurance that it
courages students and enhance their learning processes and results. In particular, gamification for
educating people about culture in order to preserve it indicates a positive effect[7]. Gamifying education
and culture can be beneficial for both learners and instructors. This study aims to propose an approach
to engage the young generation to learn about Minangkabau culture. It focuses on the learning of
Minangkabau traditional food using gamification elements in a mobile quiz application. By engaging
users in learning about their culture, the cultural heritage is conveyed to the future generations and
remains alive.

2. Literature Review

A number of previous studies proposing gamification as a learning enhancement approach have recently
been conducted. In [8], some limitations of massive open online courses (MOOCs) have been addressed
by proposing gamification approach relies on weekly feedback in order to make the student stay
motivated intrinsically and extrinsically. The scheme of the approach corresponds to the iMooX
platform of offering four-dimensional variables (watching videos, quiz attempts, login activity,
discussing in the forum). The general engagement was gained in reliance on feedback using battery
completion icon that displays a gamification element based on those variables. This approach resulted
in a noticeable increase in student’s activity and engagement during MOOCs’ courses.

Previously, [9] utilized badges as a game mechanic to encourage students engaged in an online
learning platform. The study found that the utilization of the badge-based achievement system in the
learning platform had a significant effect on the level of student engagement. In addition, students
enjoyed earning badges and having them available at the interface of learning platform.

A more recent study by [10] implemented a model to identify the factors which construct a learner’s
technology engagement in a Ubiquitous Game-Based Learning (UGL). The study integrated
Technology Acceptance Model (TAM) and Media System Dependency theory (MSD) into Technology
Engagement Model (TEM). The model indicated individual expectation (IE) and social environment
(SE) influenced the engagement of technology.

3. Methodology

3.1. Research Model

This study used a modified model developed by [10] as depicted in Figure 1. It considered ‘ease of
use’ as a moderator that moderate all the constructs in the TEM model. The individual expectation was
identified by classifying individual intention to adopt a technology into fragmented and infotainment
learning. Users expectation to acquire knowledge was defined as fragmented learning while their
innovative behavior toward technology was defined as infotainment learning. Moreover, social
environment as external variables was distinguished into peer coaching and parental support. External support was an antecedence to user engagement of technology.

![Diagram](image1.png)

Figure 1. TEM Model [10]

The model developed by [10] was modified by adding trust as a construct to the proposed model as shown in Figure 2 below. Trust is described as the users’ reliance in a tool, machine, technique, system, or method as a whole. Building trust in an online learning environment is required. Trust is imperative for ensuring effective commitments and reducing the bias level [11]. It is identified as a prominent factor in an online environment. Thus, trust was added as a variable to the proposed model. Furthermore, peer coaching was substituted by peer supports due to the facts that peer coaching is usually held in a classroom setting instead of in a mobile environment.

![Diagram](image2.png)

Figure 2. Proposed Model
The proposed model was implemented to evaluate the level of user engagement in a gamified mobile quiz application. A gamified mobile quiz, named CoTakok, was built as a tool to learn Minangkabau traditional food. The game mechanic or gamification element used for the quiz was based on points. When users have completed the quiz, a result screen with the total number of points obtained was presented to them. Since the application was relatively simple for the users to use, users were not provided with any training. Instead, they were given an overview through ‘About Application’ menu. Users are assigned to take part using the mobile quiz over 4 weeks and review the application through a questionnaire for analysis.

3.2. Hypotheses

Usefulness was interpreted as the extent to which the users believed that using a system would satisfy their needs [12]. It was strongly correlated with user intention to occupy the technology. Usefulness of a system increases user acceptance of being part of and feeling engaged with the system. In this proposed model, usefulness was classified with the setting of learning as fragmented learning and infotainment learning. Therefore, it can be hypothesized that:

H1a : Usefulness of fragmented learning in a gamified mobile quiz is positively associated with users’ engagement.

H1b : Usefulness of infotainment learning in a gamified mobile quiz is positively associated with users’ engagement.

Social influence has received significant research attention. It has been found to be a strong predictor for the adoption of a technology. The social influence is basically classified into parental supports and peer supports [13] due to the facts that parents have more control in a mobile environment rather than teachers and peers are their partners in communities. Hence, the following hypotheses are proposed:

H2a : Peer supports is positively related to users engagement in the technology adoption of a gamified mobile quiz

H2b : Parental supports positively predict the technology engagement in a gamified mobile quiz

Building trust in an online environment is required. Various studies found that people rely on their common nature to trust when in a novel circumstance. Trust is confirmed as a significant aspect to engage people adopting a technology[11]. Consequently, it is hypothesized that trust has a positive relation to the technology engagement.

H3 : Trust has a positive relation to the technology engagement of a gamified mobile quiz

The proposed model used ‘ease of use’ as a moderator due to a consideration that almost all of the mobile devices nowadays are equipped with advanced features and user-friendly interfaces. Ease of use may be not a definite factor in technology but still, exist as a moderator. Therefore, we proposed that:

H4a : Ease of use positively moderate fragmented learning and technology engagement in a gamified mobile quiz

H4b: Ease of use positively moderate infotainment learning and technology engagement in a gamified mobile quiz

H4c : Ease of positively moderate peer supports and technology engagement in a gamified mobile quiz
H4d: Ease of use positively moderate parental supports and technology engagement in a gamified mobile quiz

H4e: Ease of use positively moderate trust and technology engagement in a gamified mobile quiz

3.3. Instruments and Participants

This study used methodology that was a part of quantitative, particularly a survey technique using a questionnaire to collect data to measure the level of engagement. A total of 160 participants between 17-25 years old were randomly assigned to contribute to this study. All participants were required to complete a Likert-scale questionnaire enquiring about their impression with the gamified quiz.

Of the 160 total participants, 146 completed the survey questionnaire. Of the 146 responses, 9 were incomplete. Thus, the remaining sample of 137 participants was considered for this study and used in the statistical analysis. The sample demographics shown in Table 1 indicated that the participants are relatively representative of the population in terms of gender, age group, major, and place of origin correspond to Minangkabau tambo (darek, rantau, pasisia).

| Characteristics | N  | Percentage (%) |
|-----------------|----|----------------|
| Gender          |    |                |
| Male            | 82 | 59.85          |
| Female          | 55 | 40.15          |
| Age group       |    |                |
| 17-19           | 55 | 40.15          |
| 20-22           | 61 | 44.52          |
| 23-25           | 21 | 15.33          |
| Major           |    |                |
| Art             | 14 | 10.22          |
| Engineering     | 25 | 18.25          |
| Science         | 39 | 28.47          |
| Management      | 27 | 19.70          |
| Social Science  | 32 | 23.36          |
| Place of origin |    |                |
| Darek           | 75 | 54.74          |
| Pasisia         | 34 | 24.82          |
| Rantau          | 28 | 20.44          |

3.4. Data Analyses

Structural Equation Modelling (SEM) is a general term that has been used to represent a large number of statistical models used to assess the validity of substantive theories with empirical data. Two techniques apply: covariance-based and variance-based. The theoretical research model was tested using variance-based techniques, i.e., partial least square (PLS). In this study, SmartPLS 2.0 was utilized to validate the proposed model and test the significance of hypotheses. Following the two-step data analytical procedures, the measurement model was first examined to ensure the reliability and validity of measures, and then the structural model was tested to estimate the hypothesized relationships. Furthermore, the moderating effects were examined by calculating the size of effects.

4. Results and Discussions

4.1. Measurement Model

Internal consistency was first verified to ensure the measurement model. The measurement model was examined for (i) construct reliability, (ii) indicator reliability, and (iii) convergence validity. Table 2 shows the average variance extracted (AVE), composite reliability (CR), the values of Cronbach’s Alpha and loading factors of the model.
Table 2. Quality criteria and factor loadings

| Construct               | Item | Loading | AVE | CR  | Cronbach’s Alpha |
|-------------------------|------|---------|-----|-----|------------------|
| Fragmented Learning     | Fr1  | 0.762   | 0.905 | 0.893 |
|                         | Fr2  | 0.877   |       |      |                  |
|                         | Fr3  | 0.824   |       |      |                  |
| Infotainment Learning   | In1  | 0.723   | 0.885 | 0.911 |
|                         | In2  | 0.755   |       |      |                  |
|                         | In3  | 0.781   |       |      |                  |
| Peer Support            | Pe1  | 0.744   | 0.921 | 0.903 |
|                         | Pe2  | 0.848   |       |      |                  |
|                         | Pe3  | 0.773   |       |      |                  |
|                         | Pe4  | 0.921   |       |      |                  |
| Parental Support        | Pa1  | 0.793   | 0.939 | 0.914 |
|                         | Pa2  | 0.894   |       |      |                  |
|                         | Pa3  | 0.905   |       |      |                  |
|                         | Pa4  | 0.876   |       |      |                  |
| Trust                   | Tr1  | 0.833   | 0.909 | 0.800 |
|                         | Tr2  | 0.903   |       |      |                  |
| Technology Engagement   | TE1  | 0.704   | 0.877 | 0.790 |
|                         | TE2  | 0.831   |       |      |                  |
|                         | TE3  | 0.838   |       |      |                  |

Refer to the table, all of the constructs have CR that are higher than 0.7 and Cronbach’s Alpha values are greater than 0.6 which suggesting the constructs’ reliability. All of the items loading factor are higher than 0.7, suggesting an indicator reliability of the instrument. The convergent validity was examined with AVE, showing the significance of the minimum acceptable value of 0.50. The measurement model results indicated that the model has a good construct reliability, indicator reliability, and convergence validity. It guaranteed that the constructs are statistically distinct and can be used to examine the structural model.

4.2. Structural Model and Moderating Effects

The examination of the structural model was conducted to analyze the constructs’ relationships both in main model (without a moderator) and interaction model (with a moderator). The analysis was based on the calculation of standardized paths. The evaluation was conducted by considering the value of R square in endogen variables and their path coefficients. The levels of path significance were estimated using the 500 iterations of bootstrap resampling method. The estimation of their stability was determined by t-values (t-values=1.96 as the total sample was 137). The results are summarized in Table 3.
### Table 3. Structural model

| Causality                        | Main model | Interaction model |
|----------------------------------|------------|-------------------|
|                                  | Path coefficient | T-statistic | Path coefficient | T-statistic |
| Fragmented Learning → Engagement | 0.305       | 5.166             | 0.332            | 4.994       |
| Infotainment Learning → Engagement | -0.015     | 0.172             | -0.023           | 0.277       |
| Peer Support → Engagement        | 0.254       | 4.317             | 0.306            | 2.467       |
| Parental Support → Engagement    | 0.111       | 1.852             | 0.021            | 0.342       |
| Trust → Engagement               | 0.511       | 7.622             | 0.468            | 7.518       |
| Ease of Use (EoU) → Engagement   | -0.087      | 0.789             |                  |             |
| Fragmented L. * EoU → Engagement | -0.166      | 1.825             |                  |             |
| Infotainment L. * EoU → Engagement| -0.026      | 0.361             |                  |             |
| Parental S. * EoU → Engagement   | -0.070      | 1.025             |                  |             |
| Peer S. * EoU → Engagement       | 0.071       | 0.946             |                  |             |
| Trust * Ease of Use → Engagement | -0.209      | 2.290             |                  |             |

Furthermore, R square calculation was conducted to analyze the effect of moderation for each model. Finally, moderating effects were analyzed by examined the size of moderation using formula proposed by [14] below.

\[ f^2 = \frac{R^2 \text{ of interaction model}}{1 - R^2 \text{ of main model}} \] (1)

The calculation results showed that the size of moderation was 0.222, indicating that the effect of moderation was moderate.

### 4.3. Hypotheses Testing

Overall, of the ten hypotheses formulated, four were supported by data analysis and found significant. The model validated three relationships of the technology engagement, namely with usefulness of fragmented learning, peer support and trust. The usefulness of fragmented learning that interpreted as the users’ expectation to acquire language contributed positively to the technology engagement. Moreover, the trust relationship finding was consistent with the previous study[11]. Participants regarded trust as one of the most important constructs of technology engagement. Further, the statistical results demonstrated that neither usefulness of infotainment learning nor parental support exert any influence on technology engagement.

In term of moderating effect, this study confirmed that ease of use had a moderate effect to predispose the relationship of trust over technology engagement. Contrarily, ease of use did not have a moderating effect to influence the relationship of fragmented learning, infotainment learning, peer support, and parental support toward the technology engagement. These indicated different findings with the previous study[10]. The hypotheses results are summarized in Table 4.

### Table 4. Results of hypotheses testing

| Hypotheses          | Effect                           | Note    |
|---------------------|----------------------------------|---------|
| H1a                 | Usefulness of fragmented learning → Engagement | Approved |
| H1b                 | Usefulness of infotainment learning → Engagement | Rejected |
| H2a                 | Peer support → Engagement        | Approved |
| H2b                 | Parental support → Engagement    | Rejected |
| H3                  | Trust → Engagement               | Approved |
| H4a                 | Ease of use * Fragmented learning → Engagement | Rejected |
| H4b                 | Ease of use * Infotainment learning → Engagement | Rejected |
| H4c                 | Ease of use * Peer support → Engagement | Rejected |
| H4d                 | Ease of use * Parental support → Engagement | Rejected |
| H4e                 | Ease of use * Trust → Engagement | Approved |
4.4. Discussion

In this study, a proposed model of users’ technology engagement among the youth of Minangkabau was explored in the context of mobile quiz application that built with gamification concept. The result of this study confirmed that users’ expectation of the usefulness of fragmented learning is a significant variable, which further support the previous study [10] while the expectation of the infotainment learning is insignificant construct on the technology engagement. It represented that users’ expectation to acquire knowledge (Minangkabau traditional food) was in line with the mobile quiz engagement. On the other hand, their innovative behavior toward technology was not associated with the engagement. The results of this study have implications for practitioners to understand the process of mobile technology implementation and have a more consideration to user acceptance of the technology.

Additionally, the peer coaching was significantly predicted the engagement of users. The evidence is strong and consistent across a broad array of studies that users engaged more in peer interaction. Users may not only lean to offer information to peers but also tend to construct knowledge framework in an online setting. Thus, support from peers contributes to users’ technology engagement. In contrary, parental support was not significant to predict users’ engagement. The finding implied more chances for mobile quiz application since parents’ perception and positive evaluation of mobile application would allow the possibility for users to get more engaged to the technology.

Further, the trust relationship finding was consistent with the previous study[11]. Participants regarded trust as one of the most important constructs of technology engagement. Trust play essential roles in the engagement of mobile technology and it needs to incorporate into the design of future mobile applications. The value of trust in learning through the mobile application can give impacts on how the learners interact with the mobile environment. It may influence the way individuals to express themselves or maybe create a new self.

Ease of use was taken into account as a moderator rather than antecedence for users’ engagement. It has a significant effect to moderate the relationship of trust and technology engagement. Surprisingly, the ease of use has no significant influence to moderate the relationship of fragmented learning, infotainment learning, peer support, and parental support toward the technology engagement.

5. Conclusions

Our study used a combined model to identify the factors that enhance learning engagement of Minangkabau traditional food. The results indicated convergences and divergences with earlier findings, suggesting the unique characteristics of Minangkabau. This study indicates that the use of gamified mobile quiz contributes positively to knowledge transfer of Minangkabau traditional food among young people. Usefulness of fragmented learning, peer support, and trust were found to be the most significant factors to enhance the gamified quiz engagement. To achieve success with the gamified technique in the learning process, the objectives need to be aligned clearly. The selection of proper tool will support the positive changes in the transfer of cultural knowledge. There are still plenty of studies to be conducted in the field of gamified technology, user acceptance, and traditional knowledge in order to present enough empirical evidence to sustain a theory. Moreover, the potential for mobile technology use to learn traditional knowledge of Minangkabau is enormous.

Acknowledgments

This study was supported by the Center for Research and Community Service of Politeknik Negeri Batam. We thank our colleagues from Department of Informatics Engineering of Politeknik Negeri Batam who provided insight and expertise that greatly assisted the research.
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