

# **Habit Tracker Gamification Software Development in Community–Based Daily Personal Hygiene Using Octalysis Framework**

**Azwar Tri Endrayadi, Rezki Yuniarti**

Department of Informatics  
Universitas Jenderal Achmad Yani  
Cimahi, Indonesia

[azwartriendrayadi18@if.unjani.ac.id](mailto:azwartriendrayadi18@if.unjani.ac.id), [rezki.yuniarti@lecture.unjani.ac.id](mailto:rezki.yuniarti@lecture.unjani.ac.id)

**Faiza Renaldi\***

Department of Information Systems  
Universitas Jenderal Achmad Yani  
Cimahi, Indonesia

\*[faiza.renaldi@unjani.ac.id](mailto:faiza.renaldi@unjani.ac.id)

## **Abstract**

Personal hygiene is crucial for each human being as they have their way of maintaining them daily. While one person can maintain their hygiene, they are still prone to diseases that others can spread. Performing daily hygiene is mostly about habit. Habit is a settled or regular tendency or practice, especially one that is hard to give up. To change from one habit to another, we need a constant reminder. The development of information technology provides a more convenient way to do reminder activities. Apps such as Habit Tracker, Sure Wash, and Epic To-Do List are available freely in Google Play Store and Apple AppStore. Although many gamified reminder applications exist, most of them only work on one individual. While for daily hygiene, the problem is not only the individual habits but also the society. This study improved the awareness of personal hygiene by building gamification software. We use the Octalysis framework to analyze and design the software, using three levels: data collection, calculation, and analysis from 47 respondents using the Octalysis 8 core drive measurement. The evaluation period was carried out for 14 days using 30 respondents by analyzing Pre-test Vs. Post-test using HMSAM. Finally, this study showed a significant increase in changes in daily personal hygiene with an average of 82%, which concluded that a mobile application equipped with a reminder feature for particular groups could trigger other people to do the same.

## **Keywords**

Gamified Software, Daily Hygiene, Habit Tracker, Community–Based, Octalysis Framework

## **1. Introduction**

Personal hygiene is crucial for each human being as they have their way of maintaining them daily (Delea et al. 2020). It is an action to maintain the cleanliness and health of a person for his welfare, both physical and psychological. Personal hygiene includes hygiene and health of the skin, feet, hands, nails, teeth, mouth, hair, eyes, ears, and nose, or we can say that it is an effort to maintain the cleanliness of the body from head to toe (Desai and Goel 2018). Several steps can be taken in carrying out personal care, such as proper hand washing, which is an action that is highly recommended by the World Health Organization (WHO). Lack of adherence to the most relevant personal recommendations, namely hand hygiene, to avoid several infectious diseases (Tariq et al. 2020). Diseases coming from a lack of personal hygiene still hold imminent threats to society. For instance, despite remarkable progress over the past few years, the diarrheal disease remains the leading cause of death in children worldwide. Every year, young people aged 60 months who get diarrhea have caused 700,000 deaths (Fischer Walker et al. 2013). All this is mainly because of one individual's inability to maintain daily hygiene.

People can have health problems and are susceptible to various diseases, while some do not realize the causes. Infectious diseases such as MERS, Ebola, and SARS pose a high threat to global health. Then with the emergence of COVID-19 in December 2019 (Singhal 2020). COVID-19 is a disease caused by the SARS-COV2 virus, first discovered in Wuhan, China, in 2019. Fever, fatigue, and dry cough are common symptoms of COVID-19, and the worst consequence for humans is death (Yang et al., 2020). World Health Organization (WHO) and nations are intensely campaigning on how to prevent the spread of COVID-19 by doing personal hygiene

The issue of personal hygiene must be done every day, but sometimes it is still considered less important. Lacking public knowledge about personal hygiene makes healthy living behavior challenging to apply in the community (Gray 2018). Doing daily hygiene is mostly about habit. Habit is the effect of learning that is done gradually from a regular pattern of behavior (Stawarz, Cox, and Blandford 2014). There must be a reminder to change from one habit to another to remain consistent. Research in Indonesia shows that the habit of littering will be carried out again by someone if there is no reminder (Aprinta B, Syamsiah, and Hernofika 2017). While in everyday health studies, promote habit change with reminders such as in the area of diet (Zia et al. 2016), daily exercise (Swisher et al. 2015), and daily hygiene (Mohammed et al. 2019).

The development of information technology provides convenience in carrying out reminder activities. Applications such as Sure Wash, Habit Tracker, and Epic to-do list can be downloaded on Google Play Store and Apple AppStore. For example, one application, Sure Wash, directs users to seven steps of hand hygiene, shows each position, and allows users to practice. In addition, there is a video to check the user after completing all the steps and give the percentage result from it (Higgins and Hannan 2013). Gamification creates strategies that are used to improve organizational processes. The use of mechanical and dynamic games in several environments and applications contributes to increasing the motivation, loyalty, participation, and commitment of members of an organization (Jurado, Fernandez, and Collazos, 2015). Gamification has different from games. The characteristic difference between gamification seriously lies in the design intent (van Gaalen et al., 2021). Gamification in the health context allows for user engagement and increases engagement in health solutions. It includes the fun aspect of the gaming experience so that boring activities become fun and exciting. Gamification in health also helps to help users acquire positive emotions such as contentment, attachment, and self-esteem (Sardi, Idri, and Fernández-Alemán 2017). Research that describes information systems can support the performance of health workers using gamification to increase awareness of hand hygiene, with the result that health workers assume that it can impact performance. But this research unites and improves daily personal hygiene focusing on each individual with the same goal of motivating and engaging everyone (Marques et al., 2017). Involvement of community members or a community in the planning, implementing, and evaluating targeted hygiene messages. Other findings conclude that behavior change programs that match the needs of a community or a community can be well received for positive behavior change (Qazi and Anwar 2021) (Andrade et al. 2019). Now there is an amalgamation of the reminder software with the gamification approach. Gamification is the use of game components and design principles for non-game situations. There are elements related to the game, such as points, levels, narration, and other motivational visuals (Cheong, Filippou, and Cheong 2014). Although there are many reminder applications in the form of gamification, most of these applications are only focused on one person. The problem for daily hygiene includes the community (Bryndin 2017) (Brewis et al. 2019) (Ah Han 2019), The use of gamification in the health sector creates increased motivation and engagement (Pereira et al. 2014). The eight core drives are divided into two groups: the right brain, which characterizes creativity, and the left brain, which describes analysis. And it is divided into two parts, namely a black hat and a white hat (Yu-kai Chou n.d.).

Until now, no present studies or practical reminder software works on a group basis. This study will answer the deficiencies and create a mobile-based gamified software that serves as a reminder of daily cleanliness individually or in groups. We believe that setting reminders for a particular group will trigger others to do the same thing the other person did in that group. This mobile application is also equipped with various gamified features that will ensure users remain connected with the application.

## **2. Methods**

Information systems designers increasingly use engagement techniques to improve user experience and should always be considered in user-centered studies (Mallin and Carvalho 2015). We designed this gamification software using a combination of sequential software development phases with gamification. The research methods in this study are shown in Figure 1.

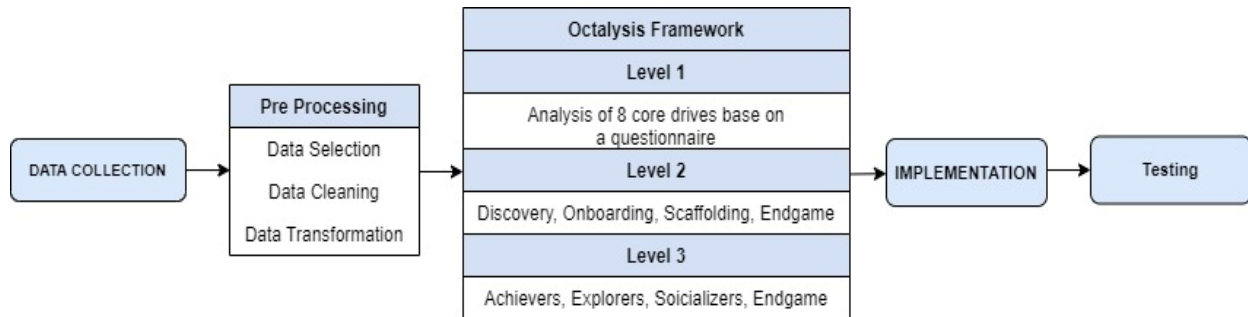


Figure 1. Research methods

## 2.1 Participants

The player will play daily hygiene gamified software as participants between the ages of 15 to 64 years old. This age range is considered a significant period of productive age (Yuniati and Kamsu, 2021).

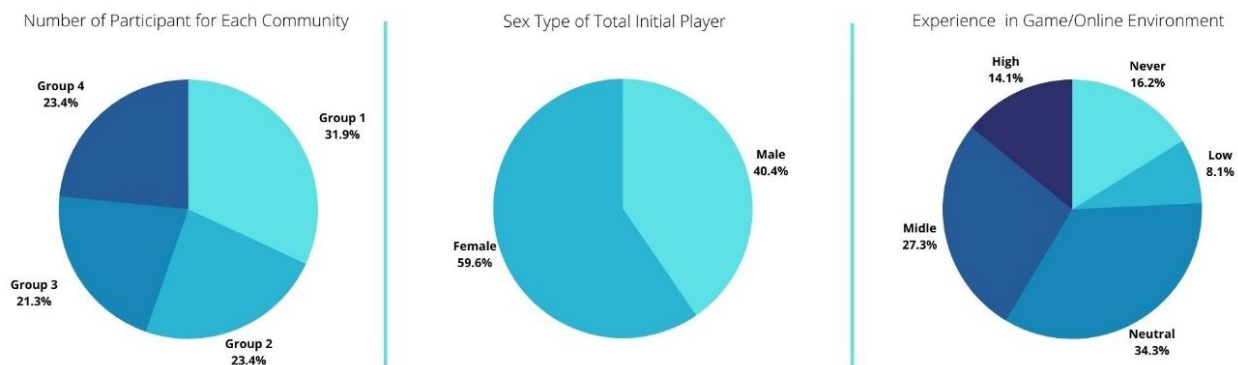


Figure 2. Player's Demography by Grade, Sex Type, and Game Experience

The number of participants in Figure 2 who filled out the questionnaire consisted of 47 participants, divided into the study group of 15 people, the teacher group of 11 people, the sports group of 11 people, and the choir group of 10. Participants experience of each game element showed ignorance as to the highest percentage, namely 34.3%. Therefore, the game elements in this game application need to be adapted and easily understood by the age group targeted in this study, resulting in a game application that can significantly impact gamification in community-based daily personal hygiene.

## 2.2 Pre-Processing

The first thing to do in pre-processing is data selection. The attribute is selected in the form of questions divided into three parts: user experience with game elements, eight-core drive Octa lysis, and aspects of daily personal hygiene. Furthermore, data cleaning is carried out to remove data that has missing values or incomplete data. For example, in the questionnaire, there are questions that participants do not fill out. Finally, perform data transformation to be transformed and saved into a form that will be applied to the tools used in the Octa lysis Framework (Agarwal 2014).

## 2.3 Octa lysis Framework

In this study, we develop a mobile-based Daily Personal Hygiene using Octa lysis Framework (Yu-kai Chou n.d.). Octa lysis is a gamification framework to discover how gamification can improve life in various aspects. Yu-Kai Chou proposed this model. The Octa lysis framework takes the shape of an octagon where each side represents a core drive. Apply three levels starting from levels 1 - 3. Level 1 contains an analysis of 8 core drives based on a questionnaire. Level 2 is a differentiation from the previous level, entering each predetermined game element into four phases: discovery, onboarding, scaffolding, and endgame. Finally, at level 3, each type of player is analyzed against each phase at the previous level 2.

### 2.3.1 Level 1 of Octalysis

The determination of the questionnaire accommodates eight-core drive Octalysis using selected respondents with a sample of 47 of four communities or community groups. The 5-level measurement scale uses a Likert scale, with the lowest score of 1 and the highest being 5 (Joshi et al. 2015). The weighted score is used to give weight to the score resulting from multiplying the Likert scale score by the number of respondents who chose the statement item. The score results are then added and given a predicate according to the specified category. Determining the predicate is done by the following mechanism.

Table 1. Octalysis Conclusion

Octalysis Core drive	Questionnaire Score	Octalysis Scale	Octalysis Score
Epic Meaning and Calling	181	8	64
Development and Accomplishment	194	8	64
Empowerment and Creativity	179	7	49
Ownership and Possession	200	9	81
Social Influence and Relatedness	175	7	49
Scarcity and Impatience	175	7	49
Unpredictability and Curiosity	180	7	49
Loss and Avoidance	180	7	49
Skor Total			454

Table 1 is the Octalysis score of the eight-core drives tested based on the Octalysis scale measurement predicate using the Likert scale data conversion process. The total score in the table above is 454, which in Figure 3 is entered into the Octalysis tools. Shows the part of each core drive that has its value.

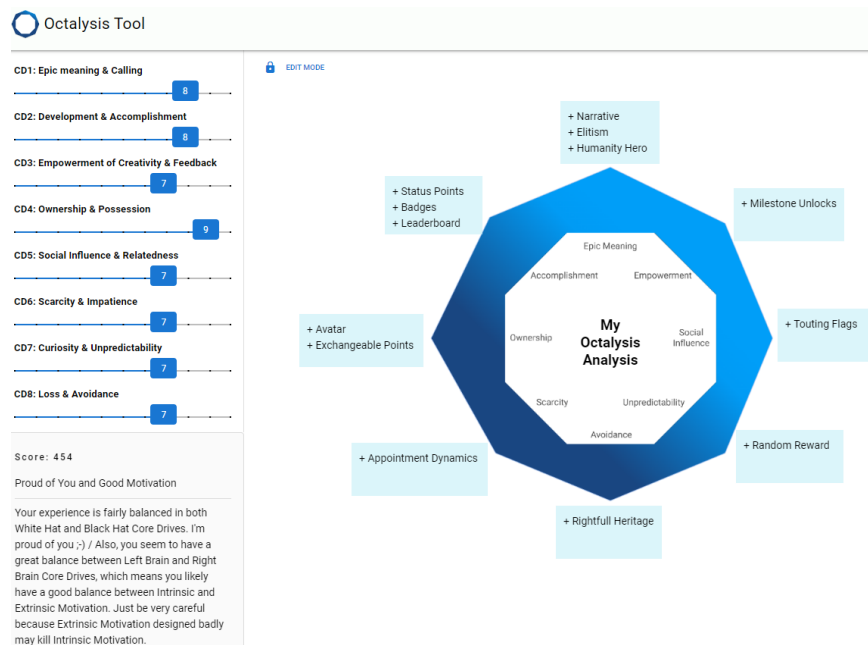


Figure 3. Octalysis Tools

Measurements using Octa lysis showed a score of 454 with the label Proud of you and Good Motivation, which indicates a balanced experience between white hat and black hat core drives and having a good balance between left and right brain core drives gives good results. And have a balance between intrinsic and extrinsic motivation.

### 2.3.2 Level 2 of Octa lysis

Based on the user motivation gap analysis of the eight-core drives Octa lysis level 1, it was determined that the three core drives implemented consisted of core drive 1 with an accurate statement of 8 with an Octa lysis scale value of high core drive 2 with a statement score of 8 with an Octa lysis scale value of high and core drive 4 with a statement score of 9 with a very high Octa lysis scale score. All the predetermined core drives and the game elements are implemented into the community-based daily personal hygiene software built. Game elements are obtained from 8 Octa lysis core drives. Furthermore, the game elements are entered into 4 phases at level 2 Octa lysis. Consists of the Discovery phase, Onboarding phase, Scaffolding phase, and Endgame phase. The first phase, namely the discovery phase, is shown in Figure 4.



Figure 4. A phase of Octa lysis Level 2

Users, when entering the application, are immediately given game elements in the form of Avatar, and Narrative, where the user chooses the character of the application used and is given an explanation of the mission of a game that must be passed and an explanation of the mission carried out. After going through the stages of the game element, the last user gets a random reward in the form of an initial reward after passing the stages. Furthermore, after the Discovery phase has been determined, entering the Onboarding phase is shown in Figure 5. Users begin recognizing the game's main plot and mission in this phase. The game elements applied and displayed in this phase are status points, leaderboards, and badges. The user enters the main page, which shows status points. Furthermore, after the Onboarding phase has been determined, enter the Scaffolding phase is shown in Figure 6. This phase is where users start using the application after going through the previous phases, namely, to get to know the main plot and mission of the game used. The game elements applied in this phase is Elitism. Furthermore, after the Scaffolding phase has been determined, entering the Endgame phase is shown in Figure 7. This phase aims to keep users using this game application after achieving the goals. The game elements applied in this phase are Humanity Hero, where users get periodic notifications about daily personal hygiene that needs to be done regularly.

### 2.3.3 Level 3 of Octa lysis

The type of each player can be identified by distinguishing the type of player: Achievers, Explorers, Socializers, and Killers. The four types of players are adapted to those at level 2 Octa lysis. This level is shown in Table 2.

Table 2. Level 3 Octa lysis

Type of Player	Characteristic	Feature Offered
<b>Achievers</b>	In a hurry to level up or get badges	High score; badges for each achievement
<b>Explorers</b>	Want to find new things	Reach a certain level and unlock the next stage.
<b>Killers</b>	Wanting to impose their will on others with a desire to defeat them	Compete to earn points

Achievement by goals set in the game and based on accumulating experience points or levels. Explorers delight in the possibility of a better understanding of how they operate or in the context of game mechanics. Lastly, Killers use games to satisfy other players by collecting points from each player (Gatautis 2021).

### 3. Results and Discussion

Develop and apply a gamification approach in the context of community-based daily personal hygiene that can be applied in the community. You have successfully created a game and taken measurements using two evaluations. The first is with internal tests comparing the goals set at the beginning with the implementation results. The second is measuring the impact obtained by a community with a community-based daily personal hygiene game application.

#### 3.1 Evaluation of Context

This phase reflects the translation of the ideation part into a more detailed and visible product. The phase also recommended the rapid development of prototypes in paper prototypes, sketches, or wireframes. The flow of the implementation described using the wireframe below is carried out based on the level 2 Octa lysis flow, which consists of phases, wherein each phase has applied game elements.

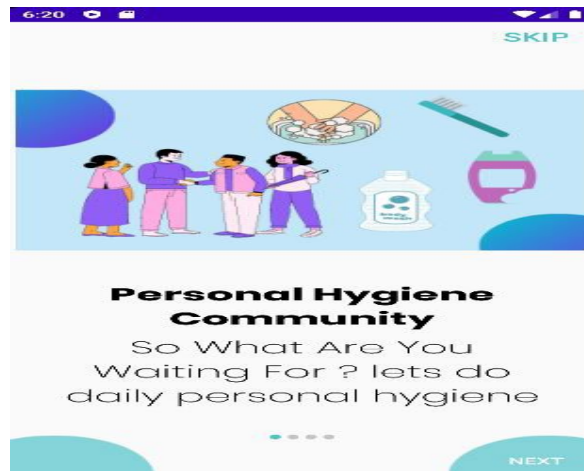


Figure 5. Welcome Screen

When the user opens the application, as shown in Figure 5, the user is on the main page. Here users are presented with game narrative elements and need to register as a user and log in. The gamification element applied is in the form of a narrative to promote a healthy lifestyle and influence Core Drive 1, namely epic meaning & calling. This picture describes the discovery phase. Narratives found on the opening page of an application provide explanations and invitations or feel called to carry out daily community-based personal hygiene. The display is beautiful so that the summoned and the user can find out how the plot is depicted in the game. The game elements aim to make users feel interested and called to continue playing the game.

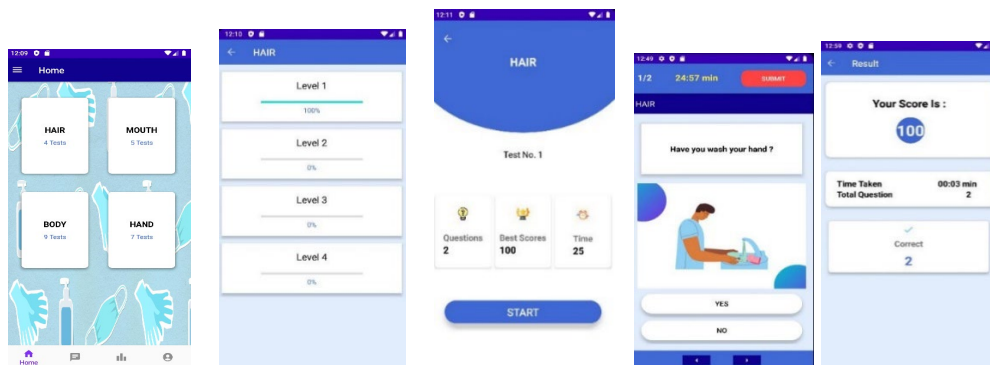


Figure 6. Activity Question & Result Screen

When the user opens the application and enters the main page, as shown in Figure 6, the user is presented with an activity page to ask questions. The first part is presented with a choice of which body part will be carried out for each user. Furthermore, there is the application of elitism game elements. Users can be motivated when they have completed it, continue to the next level, and invite others to do the same. This is done from when it is finished until the game's final stage. It provides notifications to other users in the group chat, indicating that the user has completed the level used. Each question that has been done will get a total score when the user has completed daily personal hygiene properly. Users can see their abilities results in each question at level 1. Suppose the answer is correct and has been done to each question regarding daily personal hygiene. In that case, it can be continued to the next level, level 2. At the level stage before entering the question, the percentage of answer results is displayed first

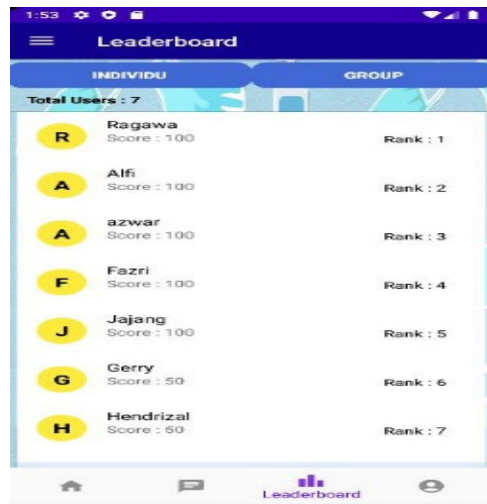


Figure 7. Leaderboard Screen

The Leaderboard screen is seen in Figure 7. Users can see the total score of individuals and others so that users will feel rewarded for consistently improving scores to stay on top of the leaderboard. Each display on the leaderboard displays a profile picture, name, score, and rank. Inside, this leaderboard screen provides information about a person's success and ability to compare with other users. Leaderboards encourage someone to try to understand that he should not be left behind by other users.

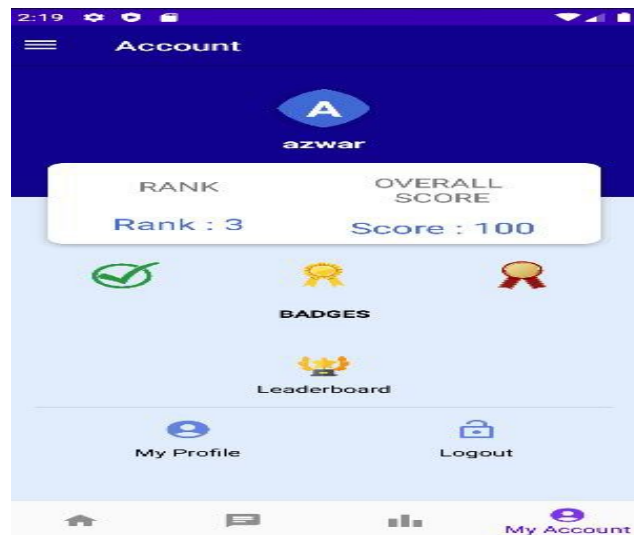


Figure 8. Profile Screen

In the profile menu, as seen in Figure 8, there are game elements in the form of badges that are applied to it. Additionally, there are game elements in the form of a rightful heritage, which are applied to the profile page apart



from badges. Applying game elements in the form of rightful heritage can motivate users to see the status points obtained and their position on the leaderboard for status rankings. In addition, the application of badges on one profile relates to the previous game element, namely rightful heritage. Still, on this badge, the user can access it in the form of an award.

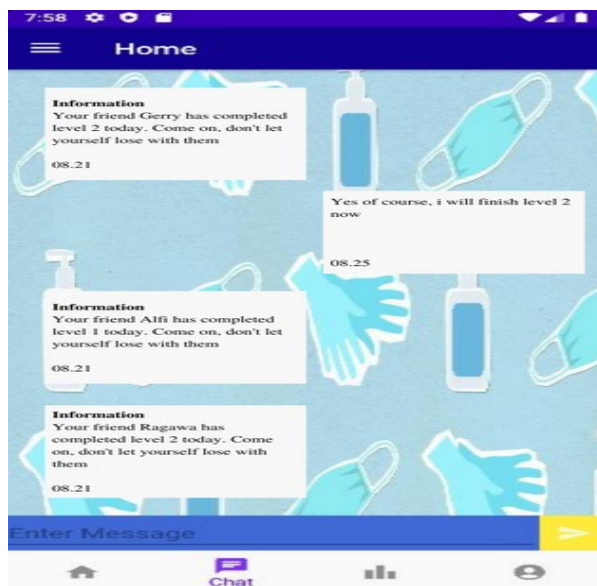


Figure 9. Notification Group Chat

Group Chat Notifications are an implementation of game elements in the form of appointment dynamics, as shown in Figure 9. Users will receive notifications periodically to ensure users stay in a game.

### 3.2 HMSAM Measurement Scales Result

The player will play daily hygiene gamified software as participants between the ages of 15 to 64 from 4 different groups: a sports group, primary school teacher, choir group, and recitation group. The mobile app was installed using a directly shared APK. We managed to have 30 participants and were treated as our initial participants. The evaluation period took place for 14 days. In the HMSAM, seven points represent the measurement scale. (Table 3) A person's desire to use an information system is determined by how much curiosity (curiosity) and feeling of pleasure one gets when using the system (joy). Still, it is also influenced by the perceived ease of using the system (perceived ease of use), how much the user sees the benefits obtained (perceived usefulness), how deep a person can get carried away when using the system (immersion), the control that the user has (control), and which influences the desire to continue to use the system. Based on as seen as Figure 2 shows the results of the user's pre-test of knowledge about game elements. The highest result shows that 34% do not know about game elements contained in other applications. So, in this study, we provide several elements of daily personal hygiene games that can have an impact on community-based daily personal hygiene.

Table 3. HMSAM Measurement Scales Result

No.	Group	Measurement							Total Score
		Joy	Control	Immersion	Curiosity	Perceived ease of use	Perceived usefulness	Behavioral Intention to Use	
1.	SportB	79.23%	81.43%	85.12%	77.12%	85.20%	86.20%	82.83%	82.45%
2.	Gempita	86.59%	79.65%	82.40%	83.20%	82.67%	84.26%	79.26%	82.58%
3.	Alhidaya	74.21%	81.23%	83.20%	85.40%	82.20%	83.65%	84.73%	82.09%
4.	Sukawargi	84.21%	85.70%	78.20%	81.20%	78.20%	79.50%	81.20%	81.17%
Total		81.06%	82.00%	82.23%	81.73%	82.07%	83.40%	82.01%	82.07%



The total percentage yield of all calculated scales is 82.07%. The highest group result is perceived usefulness using a scale of 81%, with the lowest group measurement result being 77.31%. The score for how deeply someone is carried away (immersion) is 81.22%, and what affects the desire to use continuously (behavioral intention to use) is 81.43%. If interpreted from the measurement of the scale, the group agrees that they want to use it in the future. These results also show that daily personal hygiene gamification can positively impact changes in health behavior.

#### **4. Conclusion**

We researched gamification's effect on users' daily personal hygiene, especially in a community, which ultimately saw the impact of using this software. We make daily hygiene gamified software carefully incorporating what game elements are included in a game to increase their motivation to do daily personal hygiene and keep practicing maintaining better daily personal hygiene. The results show that by adding gamified elements into the non-gamified context in the software, we can achieve all the goals set and which ultimately have an impact or impact on the daily personal hygiene of a person in a group. Target users aged 15 – 65 who can engage in fun daily personal hygiene activities while doing them. The increase in daily personal hygiene, individually and in groups, was quite significant, with an average of almost 82%, and concluded that a mobile application with a reminder feature for groups could trigger other people to do the same. Group discussions have a positive impact on bringing users to a better understanding of daily personal hygiene. Lastly, choosing the correct method for creating gamified software daily hygiene is also very important. This study chose the Octalysis framework developed by Yu-kai-Chou, which divides several game elements into eight core drives that must be considered when creating gamified software.

#### **References**

- Agarwal, Shivam. Proceedings - 2013 International Conference on Machine Intelligence Research and Advancement, ICMIRA 2013 *Data Mining: Data Mining Concepts and Techniques*.
- Ah Han, Mi. "Hand Hygiene Practices among Adults with Diabetes Living in Communities: The 2015 Korea Community Health Survey." *International Journal of Environmental Research and Public Health* 16(7). 2019.
- Andrade, Elizabeth L. et al. "Evaluating the Effectiveness of a Community-Based Hygiene Promotion Program in a Rural Salvadoran Setting." *Global Health Promotion* 26(1): 69–80. 2019.
- Aprinta B, Gita E, Sri Syamsiah, and Hernofika. "Social Marketing Strategy in Forming Student Awareness of Disposing of Garbage in Its Place." *Jurnal the Messenger* 9(2): 2017. 2017.
- Brewis, Alexandra et al. "Community Hygiene Norm Violators Are Consistently Stigmatized: Evidence from Four Global Sites and Implications for Sanitation Interventions." *Social Science and Medicine* 220(October 2018): 12–21. 2019. <https://doi.org/10.1016/j.socscimed.2018.10.020>.
- Bryndin, Evgeniy. "Healthy Wellbeing of the Person and Society." : 130–39. 2017.
- Cheong, Christopher, Justin Filippou, and France Cheong. "Towards the Gamification of Learning: Investigating Student Perceptions of Game Elements." *Journal of Information Systems Education* 25(3): 233–44. 2014.
- Delea, Maryann G. et al. "Development and Reliability of a Quantitative Personal Hygiene Assessment Tool." *International Journal of Hygiene and Environmental Health* 227(January): 113521. 2020. <https://doi.org/10.1016/j.ijheh.2020.113521>.
- Desai, Murli, and Sheetal Goel. *Rights-Based Direct Practice with Children: Child Rights Education for Participation and Development*. 2018.
- Fischer Walker, Christa L. et al. "Global Burden of Childhood Pneumonia and Diarrhoea." *The Lancet* 381(9875): 1405–16. 2013.
- van Gaalen, A. E.J. et al. "Gamification of Health Professions Education: A Systematic Review." *Advances in Health Sciences Education* 26(2): 683–711. 2021. <https://doi.org/10.1007/s10459-020-10000-3>.
- Gatautis, Rimantas. *Gamification and Consumer Engagement*. Springer Switzerland. 2021.
- Gray, Kathleen M. "From Content Knowledge to Community Change: A Review of Representations of Environmental Health Literacy." *International Journal of Environmental Research and Public Health* 15(3). 2018.
- Higgins, A., and M. M. Hannan. "Improved Hand Hygiene Technique and Compliance in Healthcare Workers Using Gaming Technology." *Journal of Hospital Infection* 84(1): 32–37. 2013. <http://dx.doi.org/10.1016/j.jhin.2013.02.004>.
- Joshi, Ankur, Saket Kale, Satish Chandel, and D. Pal. "Likert Scale: Explored and Explained." *British Journal of Applied Science & Technology* 7(4): 396–403. 2015.
- Jurado, Jose Luis, Alejandro Fernandez, and Cesar A. Collazos. "Applying Gamification in the Context of Knowledge Management." *ACM International Conference Proceeding Series* 21-22-Octo: 10–13. 2015.

- Mallin, Sandra Sueli Vieira, and Hélio Gomes de Carvalho. "Assistive Technology and User-Centered Design: Emotion as Element for Innovation." *Procedia Manufacturing* 3(Ahfe): 5570–78. 2015.
- Marques, Rita et al. "How Can Information Systems Provide Support to Nurses' Hand Hygiene Performance? Using Gamification and Indoor Location to Improve Hand Hygiene Awareness and Reduce Hospital Infections." *BMC Medical Informatics and Decision Making* 17(1): 1–16. 2017. <http://dx.doi.org/10.1186/s12911-017-0410-z>.
- Mohammed, Hisham et al. "Reminders Improve Oral Hygiene and Adherence to Appointments in Orthodontic Patients: A Systematic Review and Meta-Analysis." *European Journal of Orthodontics* 41(2): 204–13. 2019.
- Pereira, Pedro, Emília Duarte, Francisco Rebelo, and Paulo Noriega. "A Review of Gamification for Healthcare Contexts." *Design, user experience, and usability: user experience design for everyday life applications and services: 3rd international conference, DUXU 2014*: 742–53. 2014.
- Qazi, Umair, and Saeed Anwar. "Hand Washing Behavior Change Effect of Community-Based Hygiene and Sanitation Intervention in Low Resource Setting." *Journal of public health (Oxford, England)* 43(2): 381–84. 2021.
- Sardi, Lamyae, Ali Idri, and José Luis Fernández-Alemán. "A Systematic Review of Gamification in E-Health." *Journal of Biomedical Informatics* 71(May): 31–48. 2017. <http://dx.doi.org/10.1016/j.jbi.2017.05.011>.
- Singhal, Tanu. 2020. "A Review of Coronavirus Disease- (COVID-19)." *Indian Journal of Pediatrics* 87(4): 281–86. 2019
- Stawarz, Katarzyna, Anna L. Cox, and Ann Blandford. "Don't Forget Your Pill! Designing Effective Medication Reminder Apps That Support Users' Daily Routines." *Conference on Human Factors in Computing Systems - Proceedings* (April): 2269–78. 2014.
- Swisher, Anne K. et al. "Exercise and Habitual Physical Activity for People With Cystic Fibrosis." *Cardiopulmonary Physical Therapy Journal* 26(4): 85–98. 2015.
- Tariq, Mehtab et al. "Association of Literacy and Knowledge Regarding Personal Hygiene among Mothers of Children Suffering from Acute Diarrhea." *The Annals of Research* 1(January): 1–6. 2020.
- Yang, Yongshi et al. "The Deadly Coronaviruses: The 2003 SARS Pandemic and the 2020 Novel Coronavirus Epidemic in China." *Journal of Autoimmunity* 109(February): 102434. 2020. <https://doi.org/10.1016/j.jaut.2020.102434>.
- Yu-kai Chou. "The Octalysis Framework for Gamification & Behavioral Design." [www.yukaichou.com](http://www.yukaichou.com). <https://yukaichou.com/gamification-examples/octalysis-complete-gamification-framework/> (June 8, 2022).
- Yuniati, Faiza, and Sudijanto Kamsu. "Assessing the Quality of Life Among Productive Age in the General Population: A Cross-Sectional Study of Family Life Survey in Indonesia." *Asia-Pacific Journal of Public Health* 33(1): 53–59. 2021.
- Zia, Jasmine et al. "Feasibility and Usability Pilot Study of a Novel Irritable Bowel Syndrome Food and Gastrointestinal Symptom Journal Smartphone App." *Clinical and Translational Gastroenterology* 7(3): e1472016.. <http://dx.doi.org/10.1038/ctg.2016.9>.

## Biography

**Azwar Tri Endrayadi** is a bachelor's degree student at the Universitas Jenderal Achmad Yani, West Java, Indonesia, and joined Informatics in 2018. His research interests are information systems/information technology. UI design and Web Development.

**Faiza Renaldi, M.Sc.**, is a lecturer in the Department of Information Systems, Faculty of Science and Informatics, Universitas Jenderal Achmad Yani Indonesia. He received his Master of Business Informatics at Universiteit Utrecht, The Netherlands, in 2006. His research interests are health informatics, information systems/information technology management, e-government, agile project management, and IT entrepreneurship.

**Rezki Yuniarti, S.Si, M.T.**, is a lecturer in the Department of Informatics, Faculty of Science and Informatics, Universitas Jenderal Achmad Yani Indonesia. Her interest is related to game design, game AI, and AR.