SEAMEO CENTRES POLICY RESEARCH NETWORK (CPRN) SUMMIT 2025

Building Bridges to a Sustainable Future: Inclusive Collaboration and Innovation in Education, Science, and Culture

Nusainstara: A Character-Driven Storytelling in Scientific Education Approach for Intangible Cultural Heritage Education

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Intangible Cultural Heritage

Intangible cultural heritage includes traditions and living expressions passed from ancestors to descendants, such as oral traditions, performing arts, social practices, rituals, festive events, and knowledge of nature, the universe, or traditional crafts (Jones, 2018).

UNESCO's list of Indonesia ICH in need of urgent safeguarding:

Jamu Wellness Culture

Sasak Weaving Culture

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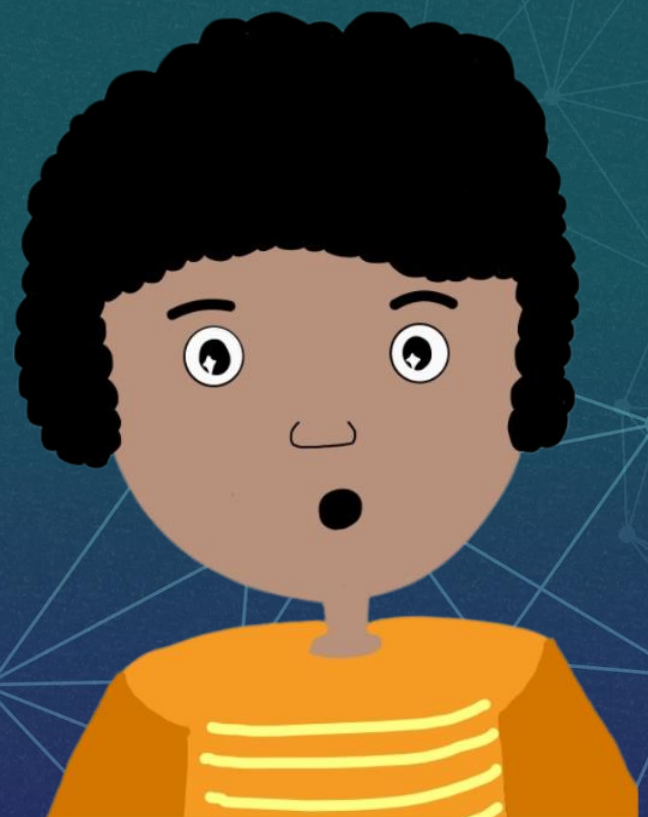

User Research

The lack of resource to engage in ICH

Scientific Education (SE)

To increase **cognitive engagement** by learning the "unpopular" science behind ICH (Liang et al., 2023)

Character-Driven Storytelling (CDS)

To boost **emotional** and **behavioral engagement** with interesting and relatable narratives and characters (Mariani et al., 2019)

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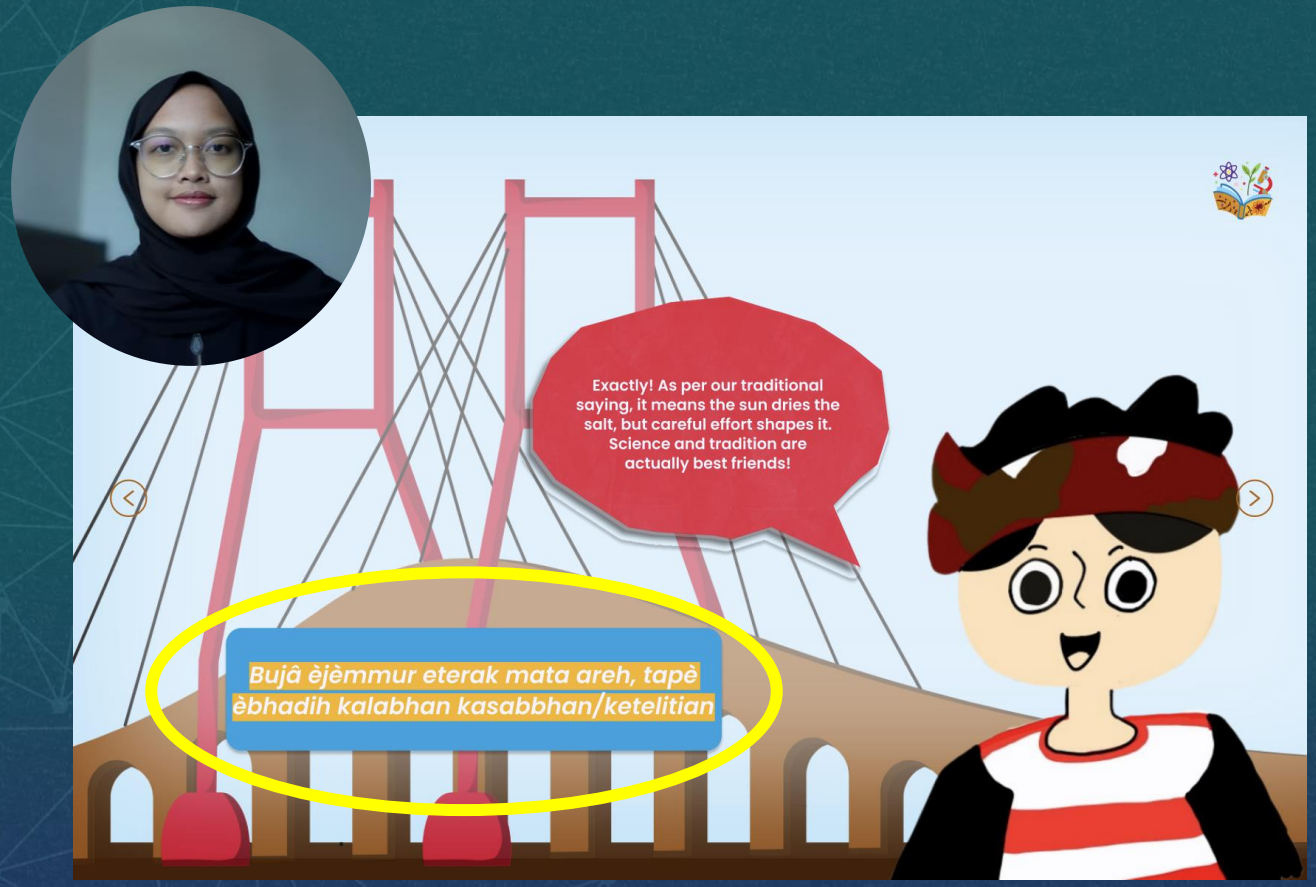
NUSAINSTARA

How do we use Character-Driven Storytelling in Nusainstara?

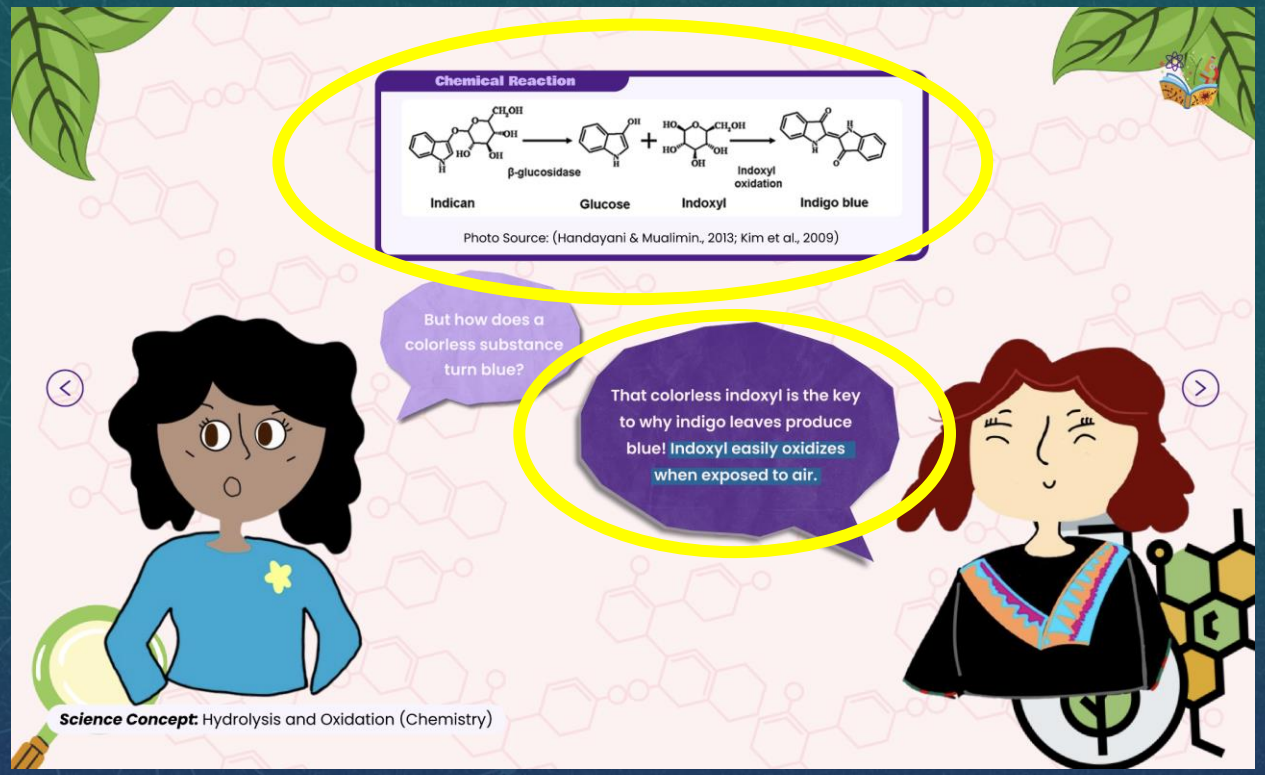


- **Nusainstara enhances Emotional Engagement** through relatable narratives and cultural values
- In the **Madura module**, local salt farmers guide users through the learning process
- In the **Sasak module**, users learn that weaving is not just a job, but a tradition passed down to preserve culture and nature
- These cultural stories help users emotionally connect with real-world practices and traditions

How do we use Character-Driven Storytelling Approach in Nusainstara?

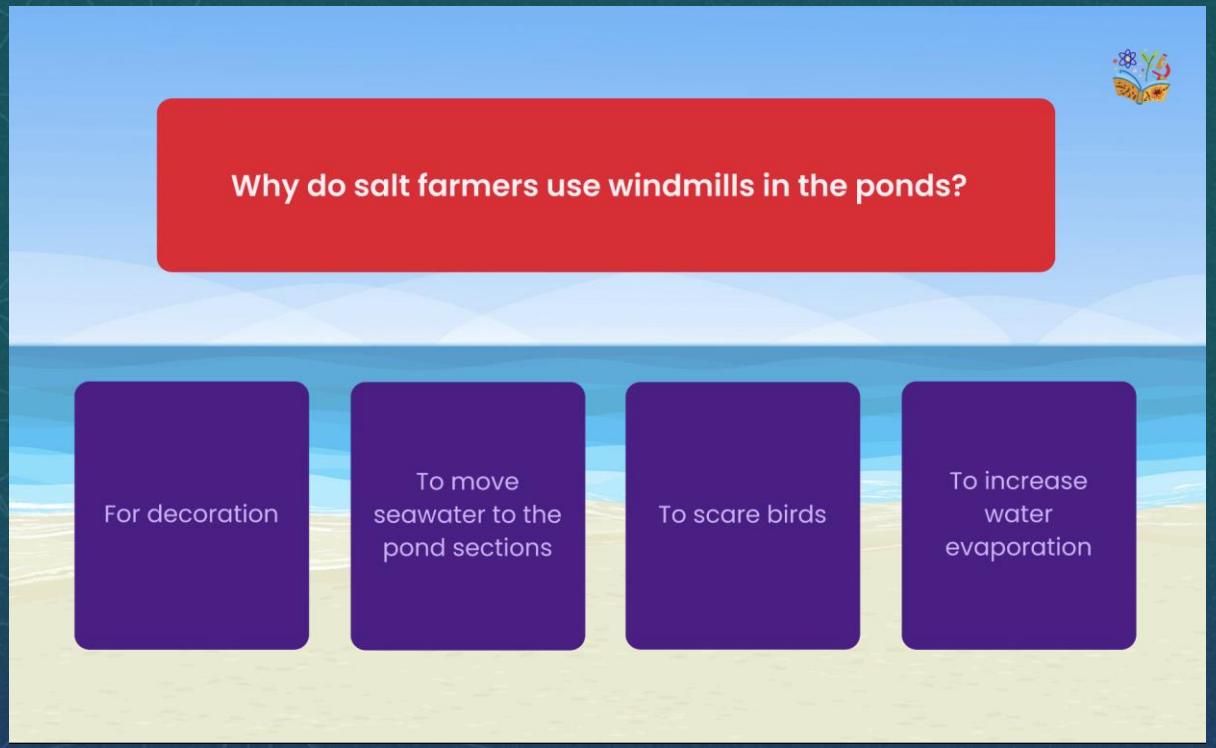
- Interactive CDS enhance Behavioral Engagement
- Users can choose characters that represent themselves, creating a sense of ownership.
- Users are free to choose which region to explore, making the learning process more interactive.

How do we integrate Science Education (SE) in Nusainstara?



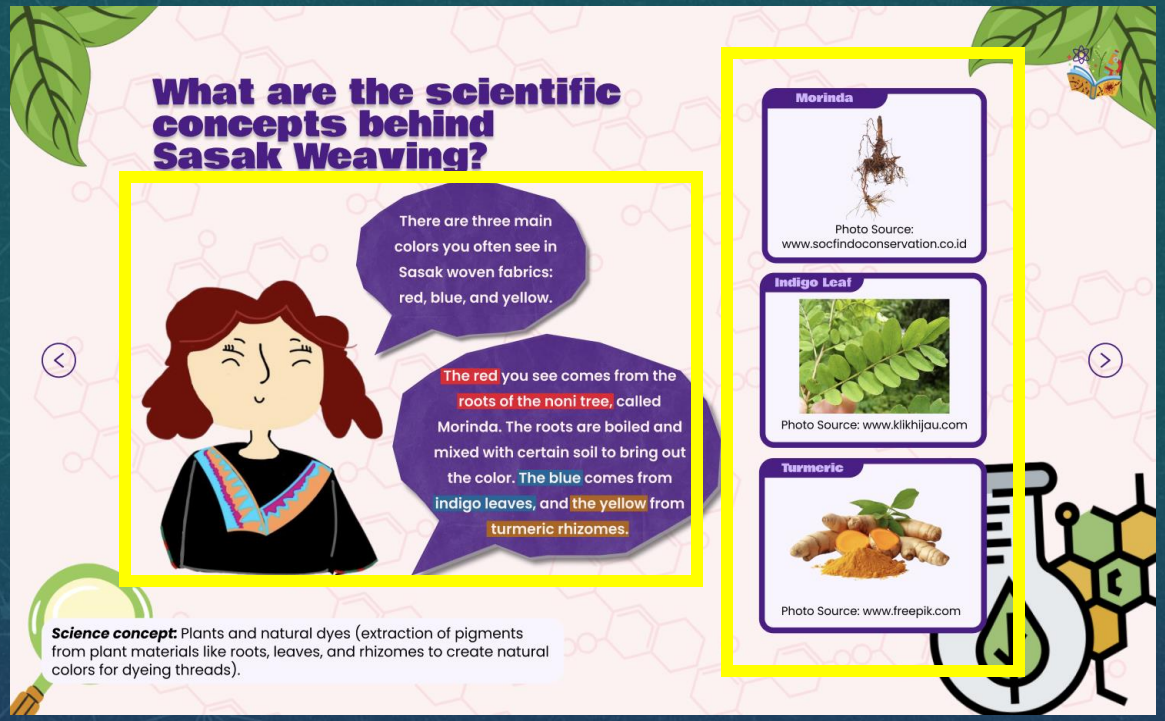
- SE allow students to make ICH relevant by integrating the **"Why"** (scientific explanation) behind ICH tradition (Yan & Li, 2023).
- E.g. oxidation/chemical process in natural dyes help students understand the science, connection to ICH, and at the same time appreciate the process of ICH tradition
- Hence, increasing cognitive engagement: analyze, applying, and synthesizing scientific knowledge in ICH setting.

How do we integrate Science Education (SE) in Nusainstara?



- End-of-lesson quiz is included in Nusainstara.
- Quiz requires participants to actively participate, thus encourage **participants' persistency**. Maintaining their focus and effort over time.
- The activity fosters **behavioral engagement**, which is characterized by observable actions like effort, attention, and task completion.

Combination of CDS + SE



CDS element

ICH element

- Links scientific inquiry to cultural narratives (e.g., biology of plants in traditional dyes)
- Connects abstract knowledge to lived experience
- Engages tech-savvy youth, making ICH relevant
- Preserves cultural heritage while promoting scientific literacy and cultural pride

Research Questions

1. Does Nusainstara's approach significantly increase students' cognitive engagement in learning Indonesia's ICH?
2. Does Nusainstara's approach significantly increase students' behavioural engagement in learning Indonesia's ICH?
3. Does Nusainstara's approach significantly increase students' emotional engagement in learning Indonesia's ICH?

Methodology

Participants

- Single-group, cross-sectional design
- 110 Indonesian students, aged 12–18
- Voluntary participation, no science background required

Collection

- 24-item online questionnaire (4-point Likert scale)
- Measured Behavioral, Cognitive, and Emotional engagement (8 items each)
- 12 reverse-coded items to ensure higher score = higher engagement

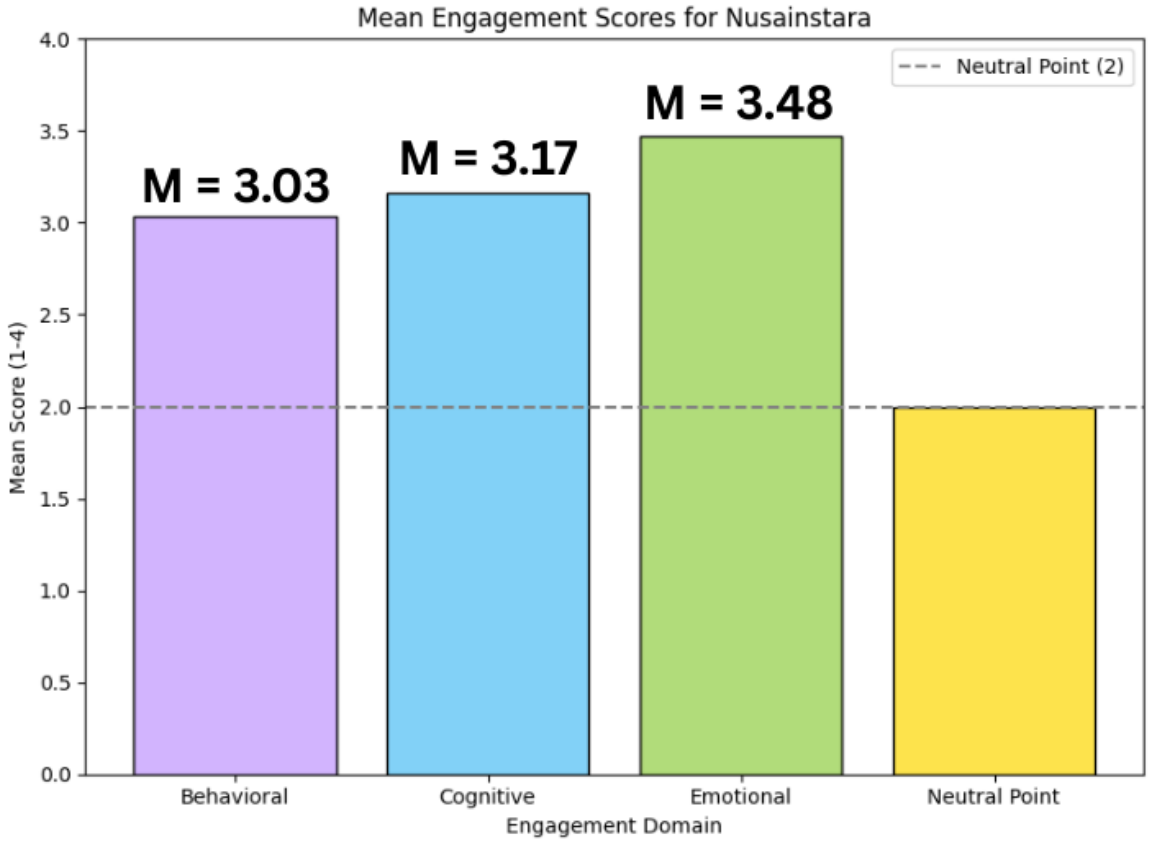
Procedures

- Students explored two Nusainstara modules (Madura & Lombok)
- Self-paced, at their own location, with supervision

Data Analysis

- Descriptive statistics (mean, standard deviation)
- One-sample t-test comparing scores to neutral midpoint (2)
- Significance level set at $p < 0.05$ to test engagement improvement

Findings



Each domain was rated on a 4-point scale (1 = strongly disagree to 4 = strongly agree). The dashed horizontal line indicates the neutral point (2).

- **Behavioral Engagement** (M=3.03): 1.03 above neutral, indicating strong student involvement via attention, effort, and persistence. Constructivist principles and engaging narratives transform ICH into enjoyable, creative learning experiences (Nisha & Prema, 2019).
- **Cognitive Engagement** (M=3.17): 1.17 above neutral, showing significant mental effort in tasks like observation, hypothesis, questioning, and quizzes. Students connect science with ICH effectively.
- **Emotional Engagement** (M=3.48): 1.48 above neutral, highest engagement. Storytelling fosters coherence, continuity, and deeper understanding of scientific content (Hadzigeorgiou, 2016).

Conclusion

- Nusainstara has signficant engagement ($p<0.05$): Behavioral ($M=3.03$), Cognitive ($M=3.17$), Emotional ($M=3.48$)
- Engaging character-driven storytelling fosters meaningful and relatable learning
- Integration of science education helps students to connect abstract knowledge to lived experience
- Nusainstara aligns with SDG 11.4, offering a scalable ICH preservation model
- Limitations: Remote development, limited cultural coverage

Policy Recommendations

Sel begitu kecil dan tidak terlihat oleh mata kita, tetapi hal tersebut tidak menghalangi para ilmuwan untuk meneliti sel. Mereka berusaha menciptakan suatu alat untuk mengamati sel, kemudian melalui proses serta penelitian yang panjang akhirnya terciptalah suatu teori tentang sel. Teori sel tersebut menyatakan bahwa

- Seluruh makhluk hidup tersusun atas sel
- Sel adalah unit dasar dari struktur dan fungsi makhluk hidup
- Seluruh sel berasal dari sel sebelumnya.

Teori sel ini berlaku untuk seluruh makhluk hidup, baik itu besar maupun kecil. Teori tersebut, mendorong para ilmuwan untuk mempelajari tentang

Fakta Sains

Apakah kalian tahu bahwa banyak ilmuwan Indonesia yang mempelajari tentang sel dan fungsinya? Salah satunya adalah Dr. Joe Hin Tjio yang merupakan pakar sel dan genetika. Beliaulah yang menemukan bahwa kromosom di tubuh manusia berjumlah 46 buah atau 23 pasang. Penemuan beliau mematahkan teori ahli genetika yang menyatakan jumlah kromosom pada manusia adalah 48 buah.

Gambar 1.3 Dr. Joe Hin Tjio (Ramadhan, 2015)

Sumber: www.goodnewsfromindonesia.id/ Cold Spring Harbor Laboratory Press, (1995)

Bab 1 Pengenalan Sel 3

- Nusainstara in **National Curriculum Textbooks** by including it in **supplementary fact boxes** to enrich learning.
- Example: In 8th-grade Science, link natural dyes in clothing to Indonesia's cultural heritage via Nusainstara, highlighting real-world applications of natural additives.

Policy Recommendations

- Teacher Training Resources: Include Nusainstara for teacher training as supporting resources.
- Training educators to maximize the use of digital platform to enhance learning experience and students' engagement while preserving ICH.
- This is align with the Ministry of Education's national consolidation for strategic plan 2025-2029: *Improving Teacher Quality, Strengthening Curriculum and Learning, Utilization of Technology, and Character Education as well as strengthening regional languages and literature*.

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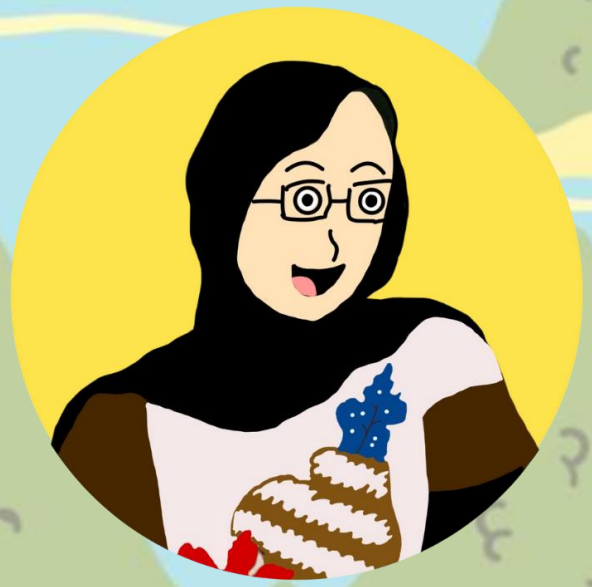

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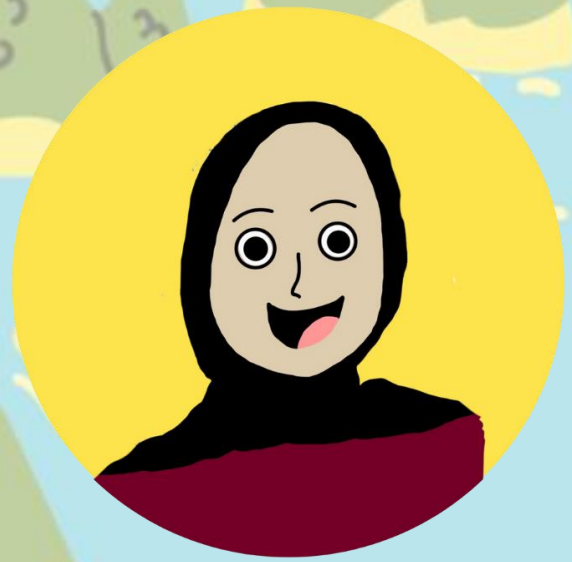

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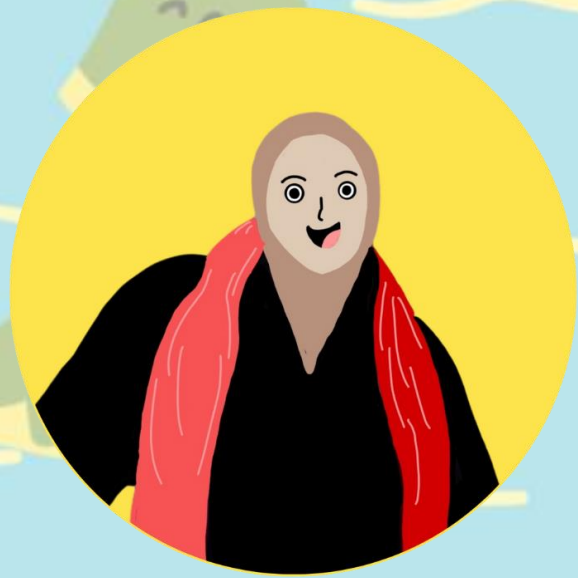

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