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Pengembangan Strategi Gamifikasi sebagai Media Edukasi Perlindungan Data Pribadi bagi Mahasiswa

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Abstrak Penelitian ini mengkaji efektivitas strategi gamifikasi dalam meningkatkan pemahaman mahasiswa terhadap Undang-Undang Perlindungan Data Pribadi No. 27 Tahun 2022. Metode yang digunakan adalah *Research and Development* (R&D) dengan model ADDIE, melibatkan 79 mahasiswa Sistem Informasi. Hasil validasi media mencapai 88%, dengan reliabilitas *Cronbach's Alpha* 0,92. Rata-rata skor *pre-test* dan *post-test* masing-masing 56,8 dan 82,3, menunjukkan peningkatan signifikan ($p < 0,01$). Sebanyak 85% mahasiswa merasa gamifikasi meningkatkan motivasi belajar, dan 90% menyukai aspek interaktifnya. Penelitian ini menyimpulkan gamifikasi efektif untuk meningkatkan pemahaman dan keterlibatan mahasiswa dalam pembelajaran UU PDP.

Kata Kunci: *Gamifikasi, Perlindungan Data Pribadi, Research and Development, Kesadaran Mahasiswa.*

Abstract This study examines the effectiveness of gamification strategies in enhancing students' understanding of the Personal Data Protection Law No. 27 of 2022. The study employed a *Research and Development* (R&D) approach using the ADDIE model, involving 79 Information Systems students. Media validation results reached 88%, with a *Cronbach's Alpha* reliability score of 0.92. The average *pre-test* and *post-test* scores were 56.8 and 82.3 respectively, indicating a significant improvement ($p < 0.01$). Additionally, 85% of students reported increased learning motivation through gamification, while 90% appreciated its interactive aspects. The study concludes that gamification is effective in improving students' comprehension and engagement in learning about data protection regulations.

Keywords: *Gamification, Personal Data Protection, Research and Development, Student Awareness.*

PENDAHULUAN

Perkembangan teknologi digital telah membawa perubahan signifikan dalam berbagai aspek kehidupan, termasuk cara individu mengelola dan membagikan informasi pribadi. Di era digital saat ini, data pribadi menjadi aset berharga yang banyak dimanfaatkan oleh berbagai platform digital untuk kepentingan bisnis, analisis, dan periklanan (Alfitri et al., 2024). Mahasiswa sebagai bagian dari generasi digital native memiliki tingkat penggunaan internet dan media sosial yang sangat tinggi, baik untuk keperluan akademik, sosial, maupun transaksi digital. Namun demikian, kesadaran mereka terhadap pentingnya perlindungan data pribadi masih tergolong rendah.

Berdasarkan survei internal yang dilakukan di Universitas Mercu Buana, sebanyak 65% mahasiswa mengaku tidak mengetahui secara mendalam isi Undang-Undang Perlindungan Data Pribadi (UU PDP) No. 27 Tahun 2022, sementara 80% mahasiswa menyatakan sering membagikan informasi pribadi di media sosial tanpa mempertimbangkan risiko keamanan data (Nopriadi, 2024). Undang-Undang Perlindungan Data Pribadi yang disahkan pada tahun 2022 ini bertujuan memberikan perlindungan hukum terhadap data pribadi individu sekaligus mengatur hak dan kewajiban dalam pengelolaannya (Disemandi, 2023). Regulasi ini menjadi sangat penting mengingat peningkatan kasus kebocoran data di Indonesia. Laporan dari Kementerian Komunikasi dan Informatika pada tahun 2023 mencatat lebih dari 40 juta data pribadi bocor akibat serangan siber, termasuk data yang berasal dari institusi pendidikan (Kemenkominfo, 2023). Kondisi ini menunjukkan urgensi peningkatan kesadaran akan keamanan data, terutama di kalangan mahasiswa yang aktif menggunakan layanan digital tanpa memahami sepenuhnya konsekuensi pengelolaan data yang tidak aman (Hapsari & Pambayun, 2023).

Salah satu tantangan utama dalam sosialisasi UU PDP adalah rendahnya minat mahasiswa dalam mempelajari regulasi hukum yang biasanya disampaikan dalam bentuk teks panjang dan formal. Hal ini menyebabkan pemahaman mereka terhadap materi perlindungan data pribadi menjadi kurang optimal (Rosadi, 2023). Oleh karena itu, dibutuhkan metode edukasi yang lebih menarik dan efektif untuk meningkatkan keterlibatan dan pemahaman mahasiswa.

Gamifikasi merupakan salah satu pendekatan inovatif yang dapat digunakan untuk meningkatkan motivasi dan keterlibatan dalam proses pembelajaran (Rahmadi et al., 2024). Gamifikasi adalah penerapan elemen-elemen permainan dalam konteks non-permainan yang dirancang untuk meningkatkan motivasi dan pengalaman pengguna (Suparmini et al., 2024). Dalam konteks edukasi perlindungan data pribadi, gamifikasi dapat diwujudkan melalui penggunaan kuis interaktif, sistem poin dan penghargaan, serta simulasi berbasis skenario nyata yang relevan dengan kehidupan sehari-hari mahasiswa (Mahbubi, 2025). Penelitian sebelumnya menunjukkan bahwa penggunaan gamifikasi dapat meningkatkan efektivitas pembelajaran

dengan memperbaiki motivasi dan retensi informasi peserta didik (Naatonis et al., 2023).

Penelitian ini bertujuan mengembangkan strategi gamifikasi sebagai media edukasi mengenai perlindungan data pribadi yang relevan, menarik, dan sesuai dengan karakteristik mahasiswa, khususnya terkait dengan UU PDP No. 27 Tahun 2022. Metode yang digunakan adalah desain kuasi-eksperimental dengan pendekatan *pretest-posttest* untuk mengukur tingkat pemahaman mahasiswa sebelum dan sesudah diberikan intervensi gamifikasi (Maciejewski, 2020). Diharapkan hasil penelitian ini dapat memberikan kontribusi dalam pengembangan strategi sosialisasi yang lebih efektif dan menarik bagi mahasiswa serta meningkatkan tingkat kepatuhan mereka terhadap prinsip perlindungan data pribadi.

METODE

1. Pendekatan Penelitian

Pada tahap awal, penelitian ini menggunakan pendekatan *mixed methods*, yaitu gabungan antara pendekatan kualitatif dan kuantitatif. Pendekatan kualitatif diterapkan dalam pengembangan prototipe gamifikasi serta penyesuaian konten berdasarkan analisis kebutuhan, sedangkan pendekatan kuantitatif digunakan untuk menguji reliabilitas dan melakukan evaluasi empiris melalui penyebaran kuesioner.

1.1. Subjek dan Objek Penelitian

Subjek penelitian ini adalah mahasiswa aktif dari program studi yang memiliki relevansi dengan materi perlindungan data pribadi, khususnya mahasiswa yang sedang menempuh mata kuliah terkait hukum, etika, atau teknologi informasi. Pemilihan subjek dilakukan menggunakan teknik *purposive sampling* dengan mempertimbangkan kemampuan mahasiswa untuk memberikan informasi yang sesuai dengan tujuan penelitian. Sebanyak 79 mahasiswa terlibat dalam penelitian ini. Kriteria inklusi meliputi mahasiswa yang sedang aktif mengikuti perkuliahan pada semester berjalan, memiliki akses ke perangkat digital seperti laptop atau *smartphone* untuk mengakses media gamifikasi, serta bersedia mengikuti seluruh rangkaian kegiatan penelitian mulai dari *pre-survey*, penggunaan media, hingga pengisian kuesioner.

Sedangkan kriteria eksklusi mencakup mahasiswa yang tidak menyelesaikan seluruh tahapan penelitian atau tidak memberikan persetujuan untuk berpartisipasi. Objek penelitian adalah penerapan gamifikasi sebagai media edukasi untuk meningkatkan pemahaman mahasiswa terhadap UU PDP. Gamifikasi ini dirancang sebagai media pembelajaran interaktif yang bertujuan

memfasilitasi peningkatan literasi regulasi melalui pendekatan yang menarik dan adaptif sesuai karakteristik mahasiswa generasi digital.

1.2. Instrumen Penelitian dan Validitas

Instrumen utama dalam penelitian ini adalah kuesioner yang dirancang khusus untuk mengevaluasi efektivitas media gamifikasi dalam meningkatkan pemahaman mahasiswa tentang perlindungan data pribadi. Kuesioner ini dikembangkan berdasarkan indikator pemahaman terhadap Undang-Undang Perlindungan Data Pribadi (UU PDP) dan prinsip-prinsip pembelajaran interaktif, bukan diadopsi secara langsung dari instrumen yang sudah ada.

Untuk memastikan validitas, dilakukan uji validitas isi (*content validity*) melalui penilaian oleh dua ahli, yaitu ahli perlindungan data dan ahli media pembelajaran digital. Selanjutnya, reliabilitas instrumen diuji dengan teknik *split-half*, di mana skor dibagi menjadi dua bagian (soal ganjil dan genap), kemudian dikorelasikan menggunakan rumus *Pearson Product-Moment*, dan hasilnya disesuaikan dengan rumus *Spearman-Brown Prophecy* untuk memperoleh koefisien reliabilitas akhir. Hasil uji menunjukkan bahwa instrumen ini valid dan reliabel, serta sesuai dengan ekspektasi dalam mengukur pemahaman mahasiswa.

1.3. Prosedur Pengumpulan Data

Proses pengumpulan data dilakukan sesuai dengan metodologi penelitian *Research and Development* (R&D). Teknik yang digunakan meliputi wawancara dan kuesioner. Kuesioner berupa formulir berisi pertanyaan yang diisi oleh responden untuk mendapatkan tanggapan yang dianalisis sesuai tujuan penelitian. Selain itu, kuesioner juga digunakan untuk menilai efektivitas program pembelajaran (Cahyo et al., 2019).

Dalam penelitian ini, pengumpulan data didukung oleh instrumen yang disesuaikan dengan kebutuhan, yaitu alat untuk mengeksplorasi model pembelajaran berbasis gamifikasi bagi mahasiswa serta instrumen untuk mengukur pemahaman mahasiswa mengenai perlindungan data pribadi.

1.4. Teknik Analisis Data

Dalam penelitian ini, data dianalisis melalui beberapa tahap. Pertama, setiap jawaban mahasiswa diberi skor 1 untuk benar dan 0 untuk salah. Skor tersebut kemudian dibagi menjadi dua kelompok berdasarkan nomor soal ganjil dan genap sesuai dengan metode reliabilitas *split-half*. Kedua kelompok skor tersebut dikorelasikan menggunakan rumus *Pearson Product-Moment* untuk memperoleh koefisien reliabilitas *split-half*, yang selanjutnya disesuaikan dengan rumus *Spearman-Brown Prophecy* untuk mendapatkan koefisien reliabilitas akhir. Untuk validitas, dilakukan analisis empiris berupa evaluasi hasil belajar

mahasiswa dengan mengukur tingkat kesulitan dan daya pembeda setiap materi. Data kuesioner dianalisis secara kuantitatif dan dikonversi untuk menentukan apakah respons mahasiswa terhadap media pembelajaran bersifat positif atau tidak.

2. Desain Penelitian

Penelitian ini menggunakan pendekatan *Research and Development* (R&D) yang terbagi menjadi dua tahap utama:

2.1. Tahap Analisis Kebutuhan

Pada tahap ini, dilakukan identifikasi kebutuhan pengembangan media pembelajaran perlindungan data pribadi dengan pendekatan gamifikasi yang sesuai untuk mahasiswa. Survei kebutuhan diikuti oleh 79 mahasiswa yang memberikan data terkait aspek-aspek penting dalam pembelajaran perlindungan data pribadi. Hasil survei tersebut dirangkum dalam Tabel 1 yang memuat temuan terkait penerapan gamifikasi.

Tabel 1. Hasil Gamifikasi

No	Pertanyaan	Sangat Setuju (SS)(%)	Setuju (S) (%)	Kurang Setuju (KS) (%)	Tidak Setuju (TS)(%)	Sangat Tidak Setuju (STS) (%)
1	Pembelajaran interaktif akan meningkatkan pemahaman saya tentang UU PDP	15,8	36,7	16,45	26,58	5,09
2	Gamifikasi dapat membuat pembelajaran lebih menarik dan mudah dipahami	27,84	43,03	15,18	8,86	5,09
3	Saya lebih menyukai metode pembelajaran konvensional dibanding gamifikasi	35,45	36,7	19,0	7,59	1,26
4	Saya membutuhkan evaluasi pemahaman berkala melalui kuis interaktif	34,17	53,17	8,86	3,8	0
5	Pemantauan progres pembelajaran sangat diperlukan	45,57	40,5	12,67	0	1,26
6	Materi yang disajikan harus mengikuti standar akademik yang berlaku	37,99	50,63	10,12	1,26	0
7	Gamifikasi dapat meningkatkan motivasi belajar saya	17,73	37,99	29,12	10,12	3,8

Berdasarkan hasil survei, mayoritas mahasiswa menginginkan pembelajaran yang sesuai dengan standar akademik, sementara sebagian lain menunjukkan minat pada metode pembelajaran berbasis gamifikasi. Namun, sebagian besar juga menganggap metode pembelajaran konvensional lebih praktis. Selain itu, hampir seluruh mahasiswa mengharapkan adanya pemantauan progres pembelajaran secara berkala untuk memastikan pemahaman mereka terus meningkat.

2.2. Tahap Perancangan

Pada tahap perancangan, informasi yang diperoleh dari analisis kebutuhan dijadikan panduan utama dalam mengembangkan media pembelajaran berbasis gamifikasi untuk materi perlindungan data pribadi. Meskipun menggunakan pendekatan gamifikasi, pengembangan materi tetap mengacu pada standar akademik yang berlaku agar mahasiswa memperoleh pemahaman yang mendalam terhadap konsep perlindungan data pribadi. Format pembelajaran disesuaikan dengan kurikulum untuk memberikan pengalaman belajar yang optimal dan memudahkan mahasiswa dalam memahami materi.

Materi gamifikasi dirancang agar pembelajaran terasa lebih menyenangkan dan mudah diakses. Sistem ini juga menyediakan umpan balik langsung terkait tingkat pemahaman mahasiswa terhadap materi perlindungan data pribadi. Sebagai bentuk apresiasi atas pencapaian pembelajaran, mahasiswa yang berhasil mencapai tingkat pemahaman tertentu akan menerima sertifikat penghargaan. Selain itu, durasi setiap sesi pembelajaran diatur agar efektif, sehingga mahasiswa dapat memanfaatkan waktu belajar secara optimal sesuai dengan kebutuhan mereka.

HASIL DAN PEMBAHASAN

Prototipe media gamifikasi yang dikembangkan terlebih dahulu divalidasi oleh ahli perlindungan data guna menilai kelayakan produk digital tersebut. Jika ditemukan masukan atau saran perbaikan, revisi akan dilakukan untuk meningkatkan kualitas produk. Setelah perbaikan selesai, dilakukan uji coba lapangan sebanyak satu kali untuk mengevaluasi kinerja prototipe secara langsung. Hasil uji coba lapangan dianalisis untuk mengidentifikasi aspek-aspek yang perlu ditingkatkan lebih lanjut. Selain itu, evaluasi juga mencakup pengujian efektivitas, validitas, dan reliabilitas produk secara empiris. Tahap perbaikan ini bertujuan menyempurnakan media pembelajaran berbasis gamifikasi agar sesuai dengan kebutuhan pengguna.

1. Penilaian Ahli

Para ahli perlindungan data memberikan penilaian yang sangat baik terhadap materi gamifikasi yang dikembangkan. Penilaian tersebut mencakup beberapa aspek, yakni pengalaman pengguna, konten, dan antarmuka pengguna. Skor yang diberikan mencapai total 25 untuk aspek pengalaman pengguna, 54 untuk aspek konten, dan 19 untuk aspek antarmuka pengguna. Sebagian besar aspek dinilai pada level skor 5, dengan hanya dua aspek yang mendapatkan skor 4. Hasil ini menunjukkan bahwa materi gamifikasi yang dibuat memiliki kualitas sangat tinggi menurut perspektif para ahli.

2. Ujicoba Pembelajaran

2.1. Tingkat Kesulitan Materi

Tingkat kesulitan materi yang disajikan dalam media gamifikasi diukur berdasarkan respons peserta. Tabel 2 menyajikan distribusi tingkat kesulitan materi yang diperoleh. Sebagian besar materi (54,54%) dinilai memiliki tingkat kesulitan normal, diikuti oleh 34,36% materi yang tergolong sulit, dan 9,1% materi yang mudah.

Tabel 2. Persentase Tingkat Kesulitan Materi

Level	Jumlah Materi	Persentase (%)
Mudah	9	9,1
Normal	54	54,54
Sulit	36	34,36
Total	99	100

2.2. Daya Pembeda Materi

Daya pembeda materi menunjukkan sejauh mana materi dapat membedakan antara peserta yang memahami dan yang kurang memahami materi. Tabel 3 menyajikan distribusi daya pembeda materi.

Tabel 3. Persentase Daya Pembeda Materi

Level	Jumlah Materi	Persentase (%)
Sangat Baik	4	4,04
Baik	22	22,33
Cukup	25	22,25
Kurang	48	48,49
Total	99	100

Dari Tabel 3, hampir setengah materi (48,49%) memiliki daya pembeda yang kurang, sementara hanya 4,04% yang sangat baik. Hasil uji coba menunjukkan bahwa hampir setengah dari materi memiliki daya pembeda yang

kurang, yang berarti materi tersebut kurang efektif dalam membedakan tingkat pemahaman mahasiswa. Hal ini bisa mengindikasikan bahwa beberapa konten materi mungkin terlalu umum atau tidak cukup menantang untuk membedakan mahasiswa yang benar-benar paham dengan yang kurang paham. Oleh karena itu, perbaikan pada materi yang memiliki daya pembeda rendah perlu dilakukan, misalnya dengan menyusun soal atau konten yang lebih variatif dan menantang agar meningkatkan kemampuan diskriminasi pada evaluasi pemahaman. Selain itu, keseimbangan antara tingkat kesulitan materi juga harus diperhatikan agar tidak terlalu banyak materi yang terlalu mudah atau terlalu sulit sehingga dapat mempertahankan motivasi belajar mahasiswa.

3. Reliabilitas Materi

Reliabilitas materi dihitung menggunakan metode *Split-Half Reliability* dengan membagi skor tes mahasiswa ke dalam dua kelompok (ganjil dan genap). Koefisien korelasi antar kelompok dihitung menggunakan rumus *Pearson Product-Moment*, menghasilkan nilai $r = 0,854$. Selanjutnya, nilai ini disesuaikan menggunakan rumus *Spearman-Brown Prophecy* sehingga diperoleh reliabilitas total sebesar $r_{11} = 0,92$, yang menunjukkan reliabilitas sangat tinggi.

Hasil ini mengindikasikan bahwa materi pembelajaran berbasis gamifikasi ini konsisten dan layak digunakan untuk meningkatkan pemahaman mahasiswa terhadap Perlindungan Data Pribadi. Namun, analisis validitas empiris mengungkap beberapa materi yang perlu revisi karena tingkat kesulitan dan daya pembeda yang kurang optimal.

4. Respon Pengguna

Tabel 4 menunjukkan ringkasan tanggapan mahasiswa terhadap penggunaan gamifikasi dalam pembelajaran Undang-Undang Perlindungan Data Pribadi (UU PDP). Skala merepresentasikan tingkat kepuasan pengguna, di mana 5 (sangat setuju), 4 (setuju), 3 (cukup), 2 (kurang setuju), dan 1 (tidak setuju).

Tabel 4. Respon Pengguna terhadap Pembelajaran Berbasis Gamifikasi

No	Aspek	Pertanyaan	5	4	3	2	1
Antarmuka Pengguna							
1	Kemudahan Penggunaan	Aplikasi mudah digunakan?	17 (85%)	3 (15%)	0	0	0
2	Navigasi Menu	Menu mudah dipahami dan dinavigasi?	17 (85%)	3 (15%)	0	0	0
3	Pemantauan Kemajuan Belajar	Progres belajar mudah dipantau?	16 (80%)	4 (20%)	0	0	0

4	Pemantauan Materi	Jumlah materi yang telah dipelajari mudah dicek?	16 (80%)	4 (20%)	0	0	0
5	Pemantauan Materi Belum Dipelajari	Materi yang belum dipelajari mudah ditemukan?	16 (80%)	4 (20%)	0	0	0
6	Aksesibilitas	Proses login dan logout mudah dilakukan?	14 (70%)	5 (25%)	1 (5%)	0	0
7	Responsivitas Tombol	Tombol merespons dengan baik?	7 (35%)	11 (55%)	1 (5%)	0	0
8	Kejelasan Instruksi	Instruksi penggunaan aplikasi jelas dan mudah dipahami?	14 (70%)	5 (23%)	1 (5%)	0	0
Materi Pembelajaran							
9	Relevansi Materi	Konten sesuai dengan UU PDP No. 27 Tahun 2022	10 (50%)	10 (50%)	0	0	0
10	Kelengkapan Materi	Cakupan materi cukup luas dan mendalam	9 (45%)	11 (55%)	0	0	0
11	Kejelasan Contoh Kasus	Contoh kasus yang diberikan mudah dipahami	12 (60%)	6 (30%)	1 (5%)	0	0
12	Keterbacaan Teks Hukum	Pasal-pasal UU PDP disajikan dengan jelas dan mudah dibaca	6 (30%)	10 (50%)	4 (20%)	0	0
13	Kejelasan Infografis	Infografis membantu memahami materi UU PDP	16 (80%)	4 (20%)	0	0	0
14	Kejelasan Audio dalam Materi	Narasi atau audio dalam aplikasi mudah dipahami	13 (65%)	7 (35%)	0	0	0
15	Pemahaman Hasil Evaluasi	Skor hasil belajar mudah dibaca dan dipahami	6 (30%)	13 (65%)	1 (5%)	0	0
Antarmuka Visual							
16	Tata Letak Informasi	Tata letak elemen (materi, kuis, dan navigasi) sudah sesuai	11 (55%)	9 (45%)	0	0	0
17	Pemilihan Warna	Warna latar belakang dan teks nyaman untuk membaca	11 (55%)	8 (40%)	1 (5%)	0	0
18	Ukuran dan Jenis Font	Font sesuai dan mudah dibaca	5 (25%)	11 (55%)	4 (20%)	0	0

19	Kualitas Visual	Tampilan grafis dan ilustrasi mendukung pemahaman materi	12 (60%)	8 (40%)	0	0	0
20	Desain Tombol	Tampilan tombol menarik dan mudah dikenali	8 (40%)	11 (55%)	1 (5%)	0	0
21	Konsistensi Desain	Tampilan aplikasi konsisten dan profesional	11 (55%)	9 (45%)	0	0	0

5. Analisis Respon Pengguna

Hasil Hasil survei menunjukkan mayoritas mahasiswa memberikan tanggapan positif terhadap gamifikasi dalam pembelajaran UU PDP. Aplikasi dinilai mudah digunakan, dengan navigasi jelas dan membantu pemantauan progres belajar. Materi relevan dengan UU PDP No. 27 Tahun 2022. Namun, beberapa aspek perlu perbaikan, seperti kelengkapan materi, kejelasan contoh kasus, dan keterbacaan pasal-pasal hukum yang masih dianggap kurang optimal. Dari segi visual, tata letak umumnya sudah sesuai, tetapi ada masukan terkait pemilihan warna, ukuran font, dan desain tombol agar lebih menarik dan mudah digunakan.

Responsivitas tombol menjadi perhatian khusus, dengan hanya 35% pengguna memberikan penilaian tinggi. Perbaikan diperlukan agar tombol merespons input lebih cepat dan akurat. Keterbacaan teks hukum juga menjadi tantangan, sekitar 20% pengguna merasa sulit membaca pasal-pasal UU PDP. Solusi yang disarankan termasuk menambahkan highlight, ringkasan pasal, atau infografis interaktif. Hanya 30% pengguna merasa skor evaluasi tersaji dengan jelas, sehingga tampilan hasil belajar perlu diperbaiki agar lebih informatif dan mudah dipahami. Ukuran dan jenis font juga mendapat masukan, dengan sekitar 20% pengguna merasa kurang nyaman. Penyesuaian font yang lebih mudah dibaca diharapkan meningkatkan kenyamanan belajar. Dengan perbaikan aspek-aspek tersebut, pembelajaran berbasis gamifikasi ini diharapkan semakin efektif dalam meningkatkan pemahaman mahasiswa terhadap perlindungan data pribadi.

KESIMPULAN

Penelitian ini berhasil mengembangkan dan menguji strategi gamifikasi sebagai media edukasi untuk meningkatkan pemahaman mahasiswa terhadap Undang-Undang Perlindungan Data Pribadi (UU PDP) No. 27 Tahun 2022. Hasil pengujian menunjukkan bahwa media gamifikasi yang dirancang memiliki kualitas tinggi berdasarkan penilaian ahli, serta reliabilitas yang sangat baik dengan koefisien 0,92.

Meskipun sebagian materi memiliki tingkat kesulitan dan daya pembeda yang perlu diperbaiki agar lebih efektif dalam membedakan tingkat pemahaman mahasiswa, secara keseluruhan gamifikasi terbukti mampu meningkatkan motivasi belajar dan keterlibatan mahasiswa. Respon positif dari mahasiswa terhadap kemudahan penggunaan, navigasi, serta pemantauan progres pembelajaran menegaskan potensi gamifikasi sebagai metode pembelajaran yang menarik dan interaktif. Oleh karena itu, gamifikasi dapat dijadikan alternatif strategi edukasi yang efektif untuk meningkatkan literasi perlindungan data pribadi di kalangan mahasiswa, sekaligus mendukung upaya sosialisasi UU PDP secara lebih menyenangkan dan adaptif dengan karakteristik generasi digital.

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Mobile ECG App Integration and ECG Interpretation Offline Workshop for Healthcare Professionals

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Abstrak Electrocardiogram (ECG) plays a major role in diagnosing cardiovascular disease (CVD). Despite the escalating CVD rates, medical professionals exhibit suboptimal ECG interpretation skills due to inadequate training and declining competencies over time. Conventional teaching methods have proven ineffective. The Mobile ECG application was developed in 2022, employing online learning to enhance ECG interpretation. While previous studies demonstrated its effectiveness, this study aims to evaluate its impact in a one-day timeframe ECG offline workshop setting. An observational study was done using a Mobile ECG application in combination with an offline workshop. Participants were recruited using consecutive sampling. The included participants needed to meet the criteria: 1) registered as participants in one of the Jogja Cardiology Update Workshop, 2) agreed to participate in this study. Participants were assigned to a 2-hour offline workshop. Pre- and post-test analysis and System Usability Scale (SUS) questionnaire were used to evaluate the study. A total of 28 participants analyzed in the study with the majority of participants (89.7%) were general practitioners. The study showed a significant result based on the mean scores of pre- and post-tests were 29.29 ± 15.62 and 48.21 ± 16.79 ($p\text{-value} < 0.05$), respectively. According to the SUS score, this study demonstrated good usability (73.19, SD 15.45). The evaluation showed participants were satisfied, but suggested improvements, including offline access, teaching videos, and a discussion forum are further needed. Mobile ECG application is favorable to be a complementary learning media in ECG interpretation offline workshop to improve interpretation skills for healthcare professionals.

Keywords: *mobile ECG application; ECG workshop; ECG learning media; healthcare professionals; System Usability Scale*

INTRODUCTION

Cardiovascular disease (CVD) dominates 30% of deaths globally. In Indonesia, CVD remains the leading cause of illness and death, accounting for one-third of all fatal cases (Balitbangkes, 2018). According to Indonesia's basic health research (Riskesdas) conducted in 2013 and 2018, the prevalence of CVD has been on the rise, increasing from 0.5% in 2013 to 1.5% in 2018. This means that in 2018, approximately 15 out of every 1,000 Indonesians were affected by CVD (Nurwahyuni, 2023). Most CVDs can be detected early by a simple examination called electrocardiography (ECG) (Torres-Cisneros *et al.*, 2019). ECG, the most commonly used diagnostic test in cardiology, is employed as the simplest, most cost-effective, and widely accessible method used to assess the heart (Antiperovitch *et al.*, 2018). Therefore, basic ECG interpretation is an important skill for medical professionals. Lack of competence and confidence among doctors potentially leads to diagnostic inaccuracies in its interpretation, resulting in investigation and treatment delays (Baral *et al.*, 2020; Pollard *et al.*, 2021).

A study involving medical interns in several medical colleges showed unsatisfactory performance in ECG interpretation, despite their completion of advanced cardiac life support courses. Most of the participants attributed their challenges to inadequate training in college, including practical case-based training (Al Mousa *et al.*, 2023). A study in Iran, consisting of medical staff and students, showed that the participants' level of ECG interpretation competency was low. Despite the fact that they had already taken courses on ECG interpretation in their first years of work and study, one of the reasons is the "declining skills" of their practice in the long run after periods of "non-use" (Amini *et al.*, 2022). One of the challenges in learning ECG is the impractical traditional teaching methods (textbooks, lectures, and discussions). Studies have shown that those strategies are ineffective in developing critical thinking skills required in higher education, especially in medicine (Alamrani *et al.*, 2018; Joseph, Fenton, & Winchester, 2022). Nowadays, the use of electronic media as a learning method in medicine is increasing exponentially. Mobile ECG learning methods may be beneficial in assisting medical students and clinicians to practice skills, including ECG interpretation (Pollard *et al.*, 2021).

In 2022, a team from Gadjah Mada University created an ECG learning application named Mobile ECG to be the solution to this problem. Mobile ECG facilitates web-based learning, which comprehends basic ECG module topics (normal ECG, basic arrhythmia, cardiac chamber enlargement, ischemia and infarction, electrolyte and drug-induced ECG changes), difficulty-based quizzes levels, and a gallery of real ECG cases. This application has been tested several times for use (Gumilang *et al.*, 2021)

Pilot study showed that Massive Open Online Course ECG learning significantly improved subjects ECG interpretation skills required in clinical settings. A study to investigate the implementation of Mobile ECG application in an online learning environment as a supporting device had been done and significantly improved subjects in ECG interpretation (Gumilang *et al.*, 2021). However, a study to examine the implementation of Mobile ECG application in an offline learning setting had not been conducted. Thus, this study aimed to evaluate the application of Mobile ECG learning designed to improve ECG interpretation in a one-day ECG workshop setting.

METHOD

This study was an observational study conducted using a mobile-based application in combination with an offline workshop. The study population were the participants of ECG Interpretation Offline Workshop in Yogyakarta 2023. The inclusion criteria were, 1) GP participants, 2) Doctor of Medicine (MD) as their latest educational background, and 3) agreed to participate in the study from start to end. The exclusion criteria were, 1) other than GPs, and 2) not willing to participate in the study. The quantitative and qualitative data were taken prospectively using a questionnaire. The subjects were recruited using consecutive sampling.

Subjects were assigned to do a 10-minutes pretest before the workshop started. It consisted of 10 questions about ECG findings and interpretation (Table 1). Subjects were then asked to access Mobile ECG during a 2-hour offline workshop. The workshop consisted of three theoretical sessions with three cardiologists as the speakers. During the workshop, participants engaged in a learning environment in which they experienced the integration of Mobile ECG using smartphones or tablets and two-way discussion with the speakers.

After the workshop, subjects completed the post-test and completed the System Usability Scale (SUS) questionnaire. It consists of 10 items that rate the usability of Mobile ECG on a 5-point scale (1: strongly disagree to 5: strongly agree). The data obtained were computerized using SPSS version 25 and analyzed using univariate and bivariate. The Shapiro-Wilk normality test was used to test the distribution of the data.

This study was approved by The Medical and Health Research Ethics Committee (MHREC) Faculty of Medicine, Public Health and Nursing Universitas Gadjah Mada - Dr. Sardjito General Hospital (KE/1722/11/2023). Before collecting the data, the subjects were given the written informed consent.

Table 1. Items of SUS Questionnaire

Number	Item
1	<i>I think that I would like to use this system</i>
2	<i>I think the system complicated to use</i>
3	<i>I thought the system was easy to use</i>
4	<i>I think that I would need the support of a technical person to be able to use this system</i>
5	<i>I found the various functions in the system were well integrated</i>
6	<i>I thought there was too much inconsistency in this system</i>
7	<i>I would imagine that most people would learn to use this system very quickly</i>
8	<i>I found the system very cumbersome to use</i>
9	<i>I felt very confident using the system</i>
10	<i>I needed to learn a lot of things before I could get going with this system</i>

FINDINGS AND DISCUSSION

A total of 23 subjects participated in the study, with 7 male subjects and 16 female subjects. The characteristics of the participants are stated in Table 2. The mean age was 29.48 ($\pm$ 4.97) years old.

Table 2. Baseline characteristics of subjects

Characteristic	<i>n</i>	Value
Age (in years; mean)	23	29.48 $\pm$ 4.97
Sex, <i>n</i> (%)		
Male	7	30.43
Female	16	69.57

Our pilot study, investigating the impact and usability of Mobile ECG application in medical students and GP in a one-week timeframe showed that GP predominantly made up the study. This tendency could be linked to a difficult transition from academia to clinical practice, motivating them to prepare thoroughly for the demands of real-world medical settings. GPs or any other healthcare professionals, have the responsibility to treat and look after the patients while simultaneously improving competence in daily clinical activities. Unlike during preclinical years, the availability of time for learning and training as

well as the urge to receive feedback is limited. Hence, they need a practical and applicable two-way ECG learning approach.

Table 3. Analysis of pre-test and post-test scores

	Pretest	Post-test	p-value
Mean $\pm$ SD	27.83 $\pm$ 17.83	44.35 $\pm$ 19.96	0.018
Median	20	50	
Range	0-60	0-80	

The mean scores of pre- and post-tests were 27.83 $\pm$ 17.83 and 44.35 $\pm$ 19.96, respectively (Table 3). The median scores of pre- and post-test were 20 and 50, respectively. All participants showed an increase in their post-test compared to pre-test scores, except 5 that demonstrated a reduction in results. Still, this study showed a significant result (p-value < 0.05).

Our study might align with a study by Bojsen *et al.* (2015) with different target population and longer duration, evaluating the effect of 5 hours interactive ECG learning among the medical students. The study had its 5-minute introduction, 40-minute pre-test, 3 hours and 25 minutes of web-based tutorial developed by cardiologists, and 40-minute post-test session which showed a significant result with overall mean test score 52.7 (SD 16.8) in the pre-test and 68.4 (SD 12.3) in the post-test (p-value < 0.001).

The workshop consisted of three theoretical sessions with three cardiologists as the speakers. During the workshop, participants engaged in a learning environment in which they experienced the integration of Mobile ECG using smartphones or tablets and two-way discussion with the speakers.

Our participants engaged in a blended learning setting, which led to noticeable improvement, as shown by the significant results. This finding is supported by a study conducted by Viljoen *et al.* (2020) that examined the effectiveness of blended learning (utilization of web apps to facilitate ECG interpretation with immediate feedback from lecturers) and conventional lecture-based teaching. The results stated a significant score result for blended learning compared to conventional teaching. Blended method showed a 2.4-fold increase in the mean test scores (31.0% $\pm$ 13.2% in the pre-test to 75.3 $\pm$ 16.2% in the post-test, p-value < 0.001). Meanwhile, conventional teaching method was observed with a 1.6-fold improvement in the mean test scores (31.2 $\pm$ 11.5% in the pre-test to 50.3 $\pm$ 17.1% in the post-test, p-value < 0.001).

Another study by Bazrgar *et al.* (2023) also assessed the effectiveness of 20 hours of online, offline, and blended methods (10-hour online and 10-hour offline session) in residents and interns' ECG learning. The results showed that the blended method was favored by participants with the mean total exam score

(7.20 ± 1.89 , p-value 0.017). Offline (5.97 ± 2.33) and online teaching methods (6.07 ± 2.07) had similar efficacy (p-value 0.819).

Table 4. SUS study score

Evaluation	Result
SUS Study Score	73.48
Median	80
Standard Deviation	16.77
Adjective	Good
Quartile	3 rd

In this study, the overall SUS study score was 73.48 with a standard deviation (SD) of 16.77, representing good usability (Table 4). The score was considered higher compared to our previous study which investigated the use of mobile apps in an online ECG learning method as complementary device and demonstrated marginally acceptable results with the SUS score 67.5 (SD 15.16). Despite its good usability, this study still needs further improvement. The absence of data on any additional courses or training undertaken by participants before engaging with the mobile apps and attending the workshop raises questions about potential contributors to their ECG interpretation skills.

Figure 1. User Satisfaction Evaluation of Learning ECG with Mobile ECG

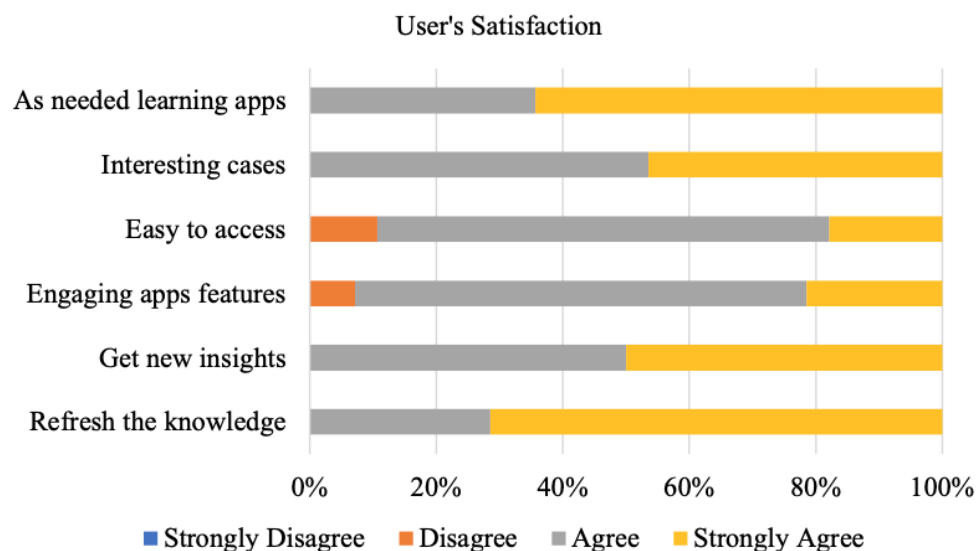


Figure 1. User's satisfaction

User satisfaction evaluation was shown in Figure 1. A few participants did not agree that Mobile ECG apps had easy access and engaging features. They noted issues, including features requiring internet connections, no teaching

videos, and no discussion forum. Additionally, some suggested a more diverse color palette for the interface.

Despite some concerns, many participants acknowledged this mobile app's effectiveness in refreshing, practicing, and gaining new insights into ECG interpretation materials. They mentioned that the materials were written in an easily understandable language, complemented by direct explanations from the speaker during the workshop. For more in-depth study, participants have the flexibility to select particular materials based on their individual needs. The option to revisit and review content at their own pace offers a more adaptable and convenient approach, fostering improved retention of the materials.

Incorporating more quizzes and online consultation features was recommended by the subjects. Furthermore, they expressed a desire for this app to be widely used by healthcare professionals, especially general physicians and nurses, knowing the significant benefits offered.

This study had certain limitations. Study participants were limited to a single workshop, resulting in a relatively small sample size. The limited time sessions might affect the comprehensiveness of data collection. Additionally, evaluation on how students had interacted with the online material was beyond the scope of our study.

CONCLUSION

The application of Mobile ECG learning in a one-day time-frame ECG offline workshop significantly improved the ECG interpretation of healthcare professionals based on pre- and post-test score measurement. The overall SUS study score was interpreted as good usability. Participants also expressed satisfaction with the contents despite a few noted feedback points.

RECOMMENDATION

Further large-scale study, including a large number of participants, is recommended to collect data to verify the effectiveness of the application of Mobile ECG in offline workshop settings as a complementary learning method in improving participants' ECG interpretation skills. Assessing participants' retention of ECG competence also needs to be done weeks or months after the intervention.

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Empowering Lifelong Learning through Digital Innovation: Evaluating the Performance and Impact of Micro-Credential Development on the UGM Online Platform

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Abstrak The growing demand for flexible and accessible learning opportunities has positioned micro-credentials as a transformation tool in higher education. Universitas Gadjah Mada (UGM), through its innovative UGM Online platform, has embraced this trend to support lifelong learning and workforce upskilling. This study evaluates the performance and impact of micro-credential development on UGM Online during its 2024 operational period, including user engagement, enrollment trends, and conversion rates. The platform recorded 37,000 visits, with 1,247 learners enrolling in various micro-credential courses, resulting in an average conversion rate of 4.23%. Monthly performance analysis revealed fluctuations in traffic and enrollments, with March showing the highest visits (6,036) but a relatively low conversion rate of 1.97%. In contrast, April and May demonstrated more balanced growth, achieving 4.35% and 5.03% conversion rates, respectively, indicating improved alignment between user expectations and course offerings. These variations highlight the success of outreach strategies in driving traffic and the need to enhance user engagement to boost enrollments. Challenges identified include optimizing the enrollment process, increasing the relevance of course content, and improving the platform's ability to convert visitors into active learners. The study underscores micro-credentials' potential to address the needs of diverse learners and industry demands while emphasizing the importance of continuous monitoring and improvement. This paper presents actionable insights for

improving micro-credential implementation on digital platforms, focusing on user-centric design, marketing strategies, and stakeholder engagement. By leveraging data-driven evaluations, UGM Online aims to strengthen its role as a leader in digital education innovation, contributing to the global conversation on scalable and impactful lifelong learning solutions. The findings provide valuable benchmarks for institutions aiming to enhance their micro-credential offerings and adapt to the evolving landscape of higher education.

Keywords: *micro-credential, lifelong learning, digital education, user engagement, higher education innovation*

INTRODUCTION

The rapid advancement of digital technologies has reshaped the landscape of higher education, fostering the development of innovative learning methods, including micro-credentials. These short, targeted learning programs have emerged as an effective solution to address the growing demand for flexible, accessible, and skill-focused education (Oliver, 2019). Micro-credentials enable learners to acquire competencies tailored to specific professional or academic needs, thereby bridging the gap between traditional education systems and dynamic workforce requirements (Kato, Galán-Muros, & Weko, 2020).

In recent years, universities worldwide have integrated micro-credentials into their curricula to support lifelong learning and upskilling initiatives. Micro-credentials also serve as a bridge for non-traditional learners, offering pathways to formal qualifications or direct entry into the workforce. This aligns with global trends, particularly the United Nations Sustainable Development Goal 4, which emphasizes inclusive and equitable quality education for all (UNESCO, 2019).

Universitas Gadjah Mada (UGM) launched its digital platform, UGM Online, in 2024 to support these objectives. The platform offers diverse learning opportunities, including micro-credentials, to enhance access to quality education. By catering to both traditional students and professionals seeking to upskill, UGM Online reflects the institution's commitment to educational innovation and lifelong learning (Brown & Nic Giolla Mhichíl, 2021). Despite its potential, the platform's engagement and learner conversion performance remains underexplored.

Preliminary analysis of the UGM Online platform shows significant traffic, with over 37,000 visits in its inaugural year. However, a modest conversion rate

of 4.23% suggests that challenges persist in engaging users and translating interest into enrollments (Shah & Pickard, 2021). These insights raise critical questions about the alignment of course offerings with learner needs, the usability of the platform, and the effectiveness of its marketing strategies.

This research evaluates micro-credentials performance on the UGM Online platform, focusing on user engagement, and the factors influencing enrollment. By leveraging performance data and identifying key improvement areas, this study provides actionable insights for enhancing digital learning experiences and broadening micro-credentials impact (Gamage, Perera, & Fernando, 2022). The findings of this study will contribute to the growing body of literature on digital education and micro-credentials. They also serve as a benchmark for other institutions seeking to implement similar platforms. The research further highlights the micro-credentials role in addressing skill gaps and fostering a culture of lifelong learning, particularly in emerging economies (Ryan & Winne, 2021).

METHOD

This research employs a mixed-methods approach, combining quantitative data analysis and qualitative insights to evaluate the performance and impact of micro-credential development on the UGM Online platform. Mixed methods are particularly effective in educational research, as they allow for a comprehensive understanding of complex phenomena by integrating numerical data with contextual narratives (Creswell & Plano Clark, 2018). The approach ensures a balanced perspective by addressing both measurable outcomes and subjective experiences of learners and stakeholders.

1.1. Quantitative Analysis

The quantitative component involves analyzing platform performance metrics, including the number of visits, enrollments, and user engagement across the 2024 operational year. Descriptive statistics and trend analyses were conducted to identify patterns in user behavior, particularly in module access and learner distribution across different subject clusters. The analysis reveals that certain disciplines, such as business, technology, and education, attract the highest engagement, while areas like engineering and sustainability receive comparatively lower interest. Additionally, learner distribution data indicate a strong preference for social and cultural studies, followed by science and technology, health, and agriculture. Conversion rate, calculated as the ratio of enrollments to total visits, served as a key indicator of platform effectiveness.

Data visualization techniques, such as line graphs and bar charts, effectively communicated these trends (Shah & Pickard, 2021). This quantitative analysis objectively evaluates platform performance and highlights periods of high or low engagement for further exploration, ensuring a data-driven approach to optimizing content offerings and learner engagement.

1.2. Qualitative Insights

Qualitative data were collected through user feedback, interviews with learners, and consultations with platform administrators to complement the numerical findings. This method provides deeper insights into learner motivations, enrollment barriers, and course quality perceptions (Oliver, 2019). Thematic analysis was employed to identify recurring themes in the qualitative data, such as the relevance of content, usability of the platform, and satisfaction with the learning experience. The integration of qualitative feedback ensures that recommendations are user-centric and aligned with actual learner needs (Brown & Nic Giolla Mhichíl, 2021).

1.3. Data Triangulation and Validity

To enhance the validity and reliability of the findings, data triangulation was employed by cross-referencing quantitative metrics with qualitative insights and secondary data from similar studies (Jirgensons & Kapenieks, 2018). This approach reduces potential biases and ensures a more holistic understanding of the platform's performance. Additionally, a pilot test of the analytical framework was conducted to refine data collection instruments and methodologies, ensuring they were appropriate for the research objectives (Gamage, Perera, & Fernando, 2022). This mixed-methods design provides a robust foundation for evaluating the UGM Online platform and its micro-credential offerings, ensuring actionable insights that address both statistical trends and human experiences.

RESULT AND DISCUSSION

1.4. Quantitative Analysis

The access data of UGM Online from January 1, 2024, to December 31, 2024, shows a total of 5,580 logins/sessions, consisting of 2,442 accesses from UGM users (43.8%) and 3,138 accesses from non-UGM users (56.2%). This indicates that non-UGM participants make up the majority of the platform's engagement, highlighting its significant reach beyond the university community.

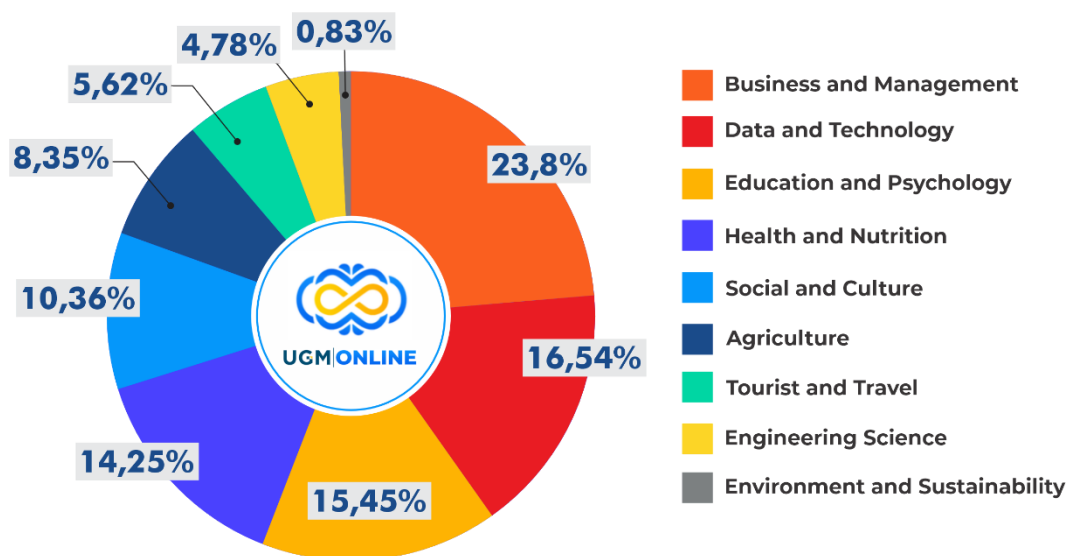


Figure 1. Number of Views per Modul

Figure 1 presents the distribution of module views per category. The most viewed category is Business and Management, comprising 23.8% of total views. This high percentage reflects a strong interest in business-related courses, potentially due to their practical applications in various professional fields. The second most accessed category is Data and Technology (16.54%), followed by Education and Psychology (15.45%). This trend suggests that learners are highly interested in acquiring digital skills and pedagogical knowledge, which align with the increasing demand for digital literacy and educational competencies. Health and Nutrition (14.25%) and Social and Culture (10.36%) also exhibit significant engagement, reflecting a keen interest in well-being and socio-cultural studies. Meanwhile, Agriculture (8.35%) and Tourism and Travel (5.62%) maintain moderate levels of engagement, possibly influenced by UGM's strong research and educational focus in these areas. Categories with lower engagement include Engineering Science (4.78%) and Environment and Sustainability (0.83%). The relatively low percentage in these fields might indicate the need for more targeted outreach or content development to attract learners interested in sustainability and engineering topics. Overall, the data suggests that learners prioritize courses with direct professional applications, particularly in business, technology, and education. The strong participation from non-UGM users also highlights the platform's potential in reaching broader audiences, making it a valuable tool for online education and knowledge dissemination.

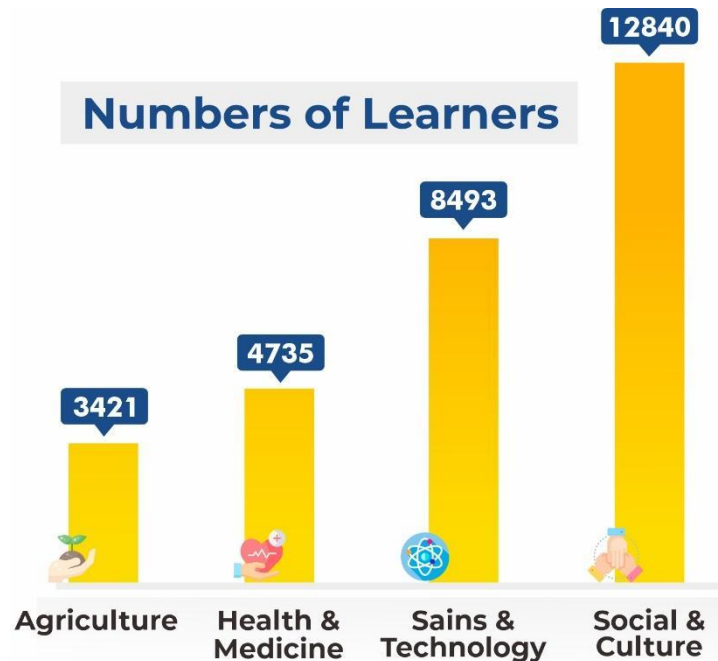


Figure 2. Number of Learners per Cluster

Further analysis of learner distribution across different academic clusters, presented in Figure 2, reveals that the Social & Culture cluster has the highest number of learners, with 12,840 participants. This suggests a strong interest in topics related to society, humanities, and cultural studies. The Science & Technology cluster follows with 8,493 learners, indicating a significant demand for courses related to scientific advancements and technological skills. The Health & Medicine cluster, with 4,735 learners, highlights the growing focus on medical and healthcare-related knowledge. Lastly, the Agriculture cluster has 3,421 learners, reflecting a niche but essential interest in agricultural sciences. These findings align with the module access trends observed in Figure 1, where business, technology, and health-related subjects attracted considerable engagement. The data suggests that learners prioritize courses that align with industry demands and career development, reinforcing the importance of offering diverse and relevant content across multiple disciplines.

1.5. Qualitative Insights

Qualitative feedback highlights several factors influencing learner engagement and platform performance. Learners consistently value the flexibility and modularity of UGM Online courses, especially within popular categories like Business and Management. However, users also report challenges related to navigation, clarity of course descriptions, and

understanding the relevance of certain offerings, particularly in clusters like Agriculture.

Interviews with faculty developers revealed a range of motivations and challenges in creating courses. While many expressed enthusiasm for contributing to UGM Online, they cited limited training in digital instructional design as a significant barrier to creating engaging and high-quality content. Enhanced capacity-building programs for faculty could address this gap and improve course offerings across underperforming clusters.

Administrative staff highlighted the importance of targeted marketing strategies to boost user engagement and enrollment. While general traffic to the platform is strong, many visitors do not proceed to enroll due to a lack of clear communication about course benefits and outcomes. This aligns with learner feedback that emphasizes the need for better information on how courses can support professional or academic advancement.

Additionally, learners identified certain content gaps within the Agriculture cluster, particularly regarding emerging topics like climate-smart agriculture and sustainable food systems. Addressing these gaps with cutting-edge, interdisciplinary course offerings could significantly enhance engagement and enrollment in this underperforming cluster.

1.6. Data Triangulation and Validation

Data triangulation was employed by cross-referencing quantitative platform metrics, qualitative learner feedback, and faculty insights. For instance, the high performance of the Business and Management category in quantitative data aligns with qualitative findings that highlight its relevance to career development and practical application. This consistency validates the category's strategic importance and provides a benchmark for other clusters.

Further, insights from faculty and learner interviews revealed that clusters with higher faculty engagement, such as Social & Humanities, tend to perform better. This finding corroborates quantitative data showing that higher faculty participation often correlates with increased learner engagement. However, the moderate performance of the Health & Medicine cluster, despite lower faculty involvement, highlights the critical role of topic relevance and quality in driving engagement.

Qualitative learner feedback about platform usability issues, such as navigation difficulties, was validated by platform performance metrics showing lower conversion rates in clusters like Agriculture. This reinforces the need for user-centered design improvements to enhance the overall learning experience and boost enrollment rates.

Finally, benchmarking UGM Online against similar platforms revealed consistent trends in learner preferences for career-oriented and interdisciplinary courses. Categories like Business and Management or courses on Food Security and Climate Change emerged as high-potential areas for investment. This external validation supports the strategic recommendations for course development and marketing enhancements to improve platform performance.

1.7. Agriculture Cluster and Course Development Trends

The Agriculture cluster on the UGM Online platform features contributions from 22 faculty members, representing a significant portion of the platform's content creators. Despite this, the cluster demonstrates relatively modest engagement and conversion rates compared to others, such as Social & Humanities and Science & Technologies. This discrepancy suggests potential gaps in aligning course offerings with learner expectations or industry demands (Gamage, Perera, & Fernando, 2022). A deeper focus on improving course relevance and addressing specific agricultural challenges could drive higher interest and participation in this cluster.

Within the Agriculture cluster, Food Security and Climate Change courses hold immense strategic value. These topics are globally recognized as critical challenges, particularly in the context of achieving the United Nations Sustainable Development Goals (UNESCO, 2019). Food security, influenced by climate variability, remains a pressing concern for policymakers and practitioners. Offering micro-credentials in this area aligns with UGM's strategic commitment to addressing national and global challenges while simultaneously catering to the interests of learners seeking specialized knowledge and practical skills in sustainable agriculture.

The intersection of Food Security and Climate Change has the potential to become a trending and favorite topic for learners, primarily due to its increasing relevance across multiple sectors. Agriculture, environmental management, and policy-making professionals are increasingly seeking up-to-date knowledge to address these intertwined challenges. Micro-credentials focusing on these topics can attract a diverse audience, including farmers, agribusiness professionals, government officials, and students pursuing sustainability-focused careers (Jirgensons & Kapenieks, 2018).

Moreover, integrating practical components, such as case studies, simulations, and project-based learning, into these micro-credentials could enhance their appeal. Learners value opportunities to apply theoretical concepts to real-world challenges, and this experiential learning approach could increase both enrollment and completion rates (Brown & Nic Giolla Mhichíl, 2021).

Furthermore, these topics naturally lend themselves to interdisciplinary collaboration, engaging experts from diverse fields to create comprehensive and impactful courses.

Given the global urgency of addressing climate change and ensuring food security, courses in this area will likely gain traction. Offering modular micro-credentials that allow stacking towards more comprehensive certifications or degrees could further enhance their appeal. Additionally, UGM could leverage partnerships with international organizations, industry leaders, and government bodies to co-develop and endorse these courses, enhancing their credibility and marketability (Oliver, 2019).

To capitalize on this trend, the Agriculture cluster must prioritize topics such as sustainable farming practices, climate-resilient crops, and technology in agriculture. By emphasizing practical applications and the direct impact of these skills on real-world challenges, UGM Online can position itself as a leader in addressing critical agricultural issues through digital education. This strategic focus could elevate the Agriculture cluster's performance and contribute to broader societal goals.

CONCLUSION

UGM Online's micro-credential platform demonstrates strong potential, particularly in high-performing categories like Business and Management and the Social & Humanities cluster, which benefit from career relevance and robust faculty participation. However, clusters like Agriculture, despite their strategic importance in addressing global challenges like food security and climate change, show lower engagement and conversion rates, highlighting a need for targeted improvements. Learner feedback reveals challenges such as navigation difficulties, unclear course benefits, and content gaps, while faculty developers emphasize the need for greater support in digital instructional design. Triangulating these findings with external benchmarks confirms that high faculty involvement, interdisciplinary course offerings, and career-oriented content drive success. To enhance impact, UGM Online should invest in emerging topics like climate-smart agriculture, improve platform usability, and expand marketing strategies to attract a broader audience and strengthen its role in addressing global educational and sustainability challenges.

Food Security and Climate Change emerge as strategic and high-potential topics within the Agriculture cluster. These globally relevant issues resonate with diverse learners, including professionals, policymakers, and students, making them ideal focal points for new micro-credential development. By emphasizing interdisciplinary approaches and real-world applications, UGM Online can

address critical societal challenges while enhancing the appeal and impact of its courses. Partnerships with industry leaders and international organizations can further strengthen the credibility and relevance of these programs.

Improving platform usability, offering robust faculty development in digital course design, and implementing targeted marketing strategies are essential to overcoming current barriers to enrollment. Data triangulation confirms that clusters with greater faculty involvement and alignment with global challenges perform better, highlighting the importance of strategic course development. By focusing on trending topics and optimizing learner engagement strategies, UGM Online can solidify its position as a leader in digital education and contribute significantly to global efforts to address sustainability and education goals.

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