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MANAGING MICRO-CREDENTIAL ONLINE PROGRAM ON GAME DEVELOPERS

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Abstract

Game is believed to be the industry and the life of the future; thus, game is not a mere entertainment. In Indonesia, the game industry is becoming a potential market to be pursued, and it has contributed to the dominant market (43%) of gamers in Southeast Asia in 2021. With its demographic bonus and game market share, Indonesia has a huge opportunity to build a gaming industry chain by accelerating organic growth through (a) talent creation; (b) flooding the market with local games; (c) competing with the international game market to increase the country's recognition and income.

ICE Institute participates in the game talent creation through coordination among 10 universities to form a consortium and offer a micro-credential program for game developers in Indonesia. Most of the game developers' training programs are delivered face-to-face, while ICE Institutes delivered it fully online. The program has attracted more than 5000 students from about 186 higher education institutions in Indonesia. After the selection process, 672 students (about 13%) participated in the 14 weeks program. Students participated in 15 credit hours courses of their selected stream: game artist, game design, game developer, educational game developer, and game project management, for 8 weeks. Afterward, students were teamed to work on developing Minimum Viable Product (MVP) games in various genres: entertainment games, serious games, and educational games. Using the virtual game lab, 54 games were developed at the end of the program. This paper will discuss the experience of ICE Institute in designing, delivering, evaluating, and coordinating the micro-credential program for game developers, and some lessons learned for future improvement of the program.

Keywords: game developer, micro-credential, design and development, Indonesia.

1 INTRODUCTION

Indonesia's higher education is expected to be transformative and agile to adapt to the changes of industry demand. Realizing that Indonesia contributed the dominant market (43%) of gamers in Southeast Asia in 2021, the game industry is becoming a potential market to be pursued in this era. With its demographic bonus and game market share, Indonesia has a huge opportunity to build a gaming industry chain by accelerating organic growth through (a) talent creation; (b) flooding the market with local games; (c) competing with the international game market to increase the country's recognition and income (CNBC Indonesia, 2022).

The game industry is one of the creative industries that is expected by the President of the Republic of Indonesia to develop and play a role in improving the Indonesian economy (CNBC Indonesia, 2022). Indonesia has a large video game market worth US$1 billion (Rp14.3 trillion) and a total of over 170 million game players. Mobile games are the main driving sector for the market and gamers in Indonesia. Currently, 95% of these games come from abroad, so it is economically detrimental to the country (AGI, 2021). The government encourages the national game industry

to dominate the domestic and foreign markets. One of them is through the development of national talent games; the human resource development in the game industry.

Universities are expected to produce educated and skillful game talents to supply the demand of the industry, yet the limited resources of educators, infrastructure, and university readiness in implementing programs are apparent constraints. A micro-credential program on game development as to produce skillful game talents is perceived to be a potential solution to overcome these limitations by optimizing the implementation of collaborative online-based programs involving various universities. ICE Institute has been pioneering to develop a micro-credential program for game developers. The program is based on the collaboration among 10 universities, i.e., University of Indonesia (UI), Gadjah Mada University (UGM), Ten November Institute of Technology (ITS), Pelita Harapan University (UPH), Bina Nusantara University (Binus), Telkom University (Tel-U), Pradita University, Amikom University, Bandung Institute of Technology (ITB), and the Open University (UT). Further, the program has also been supported by four game industries, i.e., Lentera Nusantara, Bumi Langit, Cakra, and Asosiasi Game Industri. The collaboration became the basis for significant contributions of various parties in (1) creating a game curriculum, (2) delivering the online programs and; (3) conduct periodic evaluations and improvements for teaching materials and future implementation.

This paper will discuss the experience of ICE Institute with its partners in designing, delivering, evaluating, and coordinating the micro-credential program for game developers, and some lessons learned for future improvement of the program.

1.1 THE MICRO-CREDENTIAL PROGRAM ON GAME DEVELOPERS

Creative industries are defined as ideas that produce something and provide benefits to improve the standard of living of great people. The creative industry has several advantages, including: (1) the freedom to be creative (within positive limits) can provide benefits for ourselves and others (Rochani, 2017), (Fajri, 2012); (2) increasing creativity, where freedom to be creative (within positive limits) (2) forming a special community that produces intelligent people in providing creative solutions to society (Hauge & Duin, 2013); (3) forming a special community that produces intelligent people in providing creative solutions for the public. Despite its potential, the creative industry will not be growing when lacking support of reliable human resources (Rusdi & Sukendro, 2018); lacking infrastructure, including information technology, to facilitate discussion

and exchange of ideas, creation, or production (Rochani, 2017), (Fajri, 2012); (3) and lacking of support from various parties and a mentoring or supervision system to guide people who are engaged in the creative industry (Masunah, 2017), (Lestariningsih, Maharani, and Lestari, 2019).

As one of the creative industries, the game industry in Indonesia faces concerning issue of the availability of game talent. Thus far, the game technology has not been regarded as an independent discipline to construct a study program within a university. It comes under information technology for its coding and programming stream, it comes under animation and video development, or it comes under mathematics for its computational aspect. The data in PDDikti's database shows none of game technology study program in Indonesia.

Game technology itself is a multidisciplinary area, which requires at least five disciplinary areas to collaborate, i.e., arts, design, developer/programmer, education, and management. Arts in game provides baseline theory, skills, and knowledge on becoming a game artist. Also, design to game designer; developer/programmer to game developer/programmer; education to the educational game developer; and management to game project management. Game development is labor-intensive and requires a multidisciplinary team effort of skilled professionals to integrate multimedia content using certain software. High-quality game products will be produced when there is a solid team working on high levels of communication, organization, and planning to avoid costly delays and failures (Maxim, 2007).

Based on the above-mentioned consideration, the Micro-credential Program for Game Developers (MPGD) was collaboratively designed as a part of the effort in creating game talent for developing the game industry in Indonesia. It was a collaborative work by 10 universities and four game industries, i.e., University of Indonesia (UI), Gadjah Mada University (UGM), Ten November Institute of Technology (ITS), Pelita Harapan University (UPH), Bina Nusantara University (Binus), Telkom University (Tel-U), Pradita University, Amikom University, Bandung Institute of Technology (ITB), the Open University (UT), Lentera Nusantara, Bumi Langit, Cakra, and Asosiasi Game Industri. Experts in the university's consortium defined the structured game curriculum prepared for the development of game talent in Indonesia as an independent study/student exchange program through the ICE Institute. Meanwhile, the expert from the industry provided a market analysis and competency analysis of the game developer for the graduates (AGI, 2021).

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The objective of the (MPGD) program is to create students who will become creative and skillful game talent in the national game industry. Specifically, at the end of the program, students are expected to have competency in creating digital games. The curriculum was designed based on the double diamond design thinking framework from Nessler (2016).

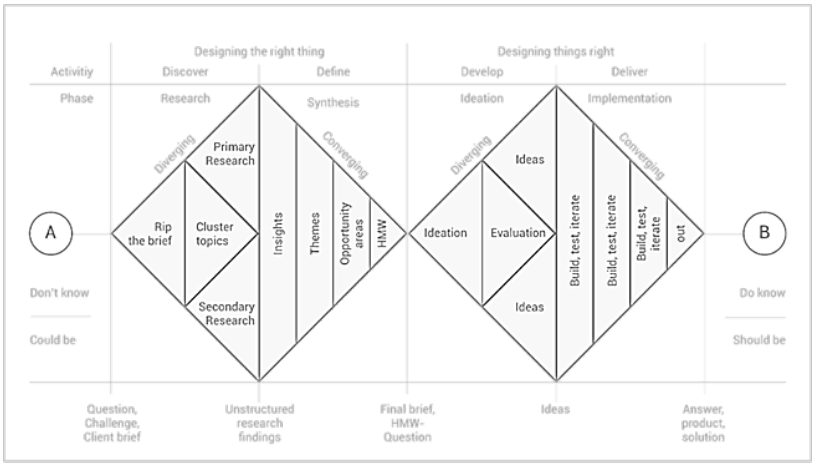

Figure 1. Nessler's Double Diamond Design Framework – Revamped (2016)

Nessler's double diamond design thinking originated from the UK Design Council (https://www.designcouncil.org.uk/). The framework provides a means for designers, creative thinkers, or even project managers to set up, frame, organize, structure, run or manage creative design works and projects. Since game development is considered a creative work, the double diamond design thinking framework fits the purpose to design the curriculum of the MPGD program.

The first diamond of "discover and define" is covered through the 5 streams of learning for 15 credit hours for 8 weeks: game design, game artist, game programmer, educational game developer, and project management. Each student will engage in various seminars and activities to discover and define their own stream area within the big picture of the game development process.

The second diamond of "develop and deliver" is the basis of the Capstone Project of 5 credit hours, where students in groups must develop a game for 6 weeks, and deliver the game to a minimum game industry standard to graduate from the program.

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In general, the curriculum of the MPGD program is depicted as follows:

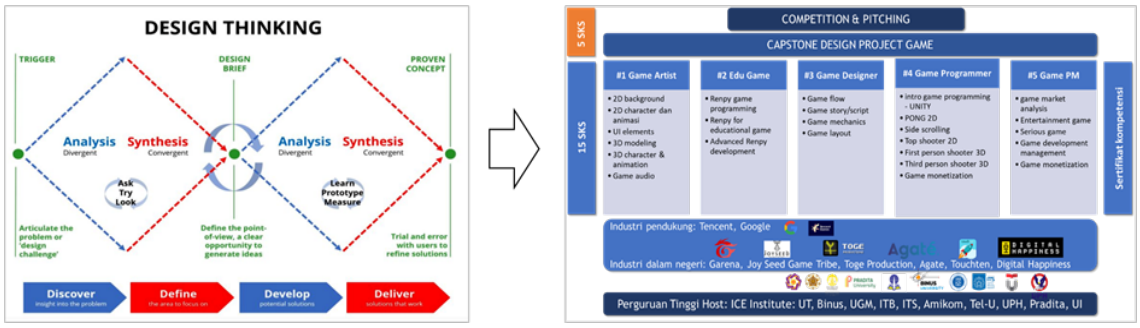

Figure 2. The curriculum of Micro-credential Program for Game Developers

The study load of this MPGD program is 20 credits which are to be completed by students in 14 weeks with intensive assistance from mentors. It consists of 5 main streams of 15 credits each and 1 Capstone Project of 5 credits. The description of each stream is as follows:

Table 1. Curriculum Content

STREAM	CONTENT
Game Designer: This program is aimed at developing the talent of game developers in designing the plot of a game which includes story concepts, level arrangements, and interface design;	1. Game Layout 2. Game Mechanic Design 3. Game Flow Design 4. Game Story Design
Game Artist/Asset: This program is aimed at developing the talents of audio-visual virtual object resource developers in building games;	1. Game UI 2. Game Audio Engineering 3. 3D Game Modelling 4. 3D Game Animation 5. 2D Game Animation 6. 2D Game Object
Game Programmer: This program is aimed at developing the talent of game developers in building fundamental game mechanics based on the application of algorithms and programming logic;	1. Introduction to Unity Game Engine 2. Building Microgamer: Pong 2D 3. Building Microgamer: Side Scrolling Platformer 2D 4. Building Microgamer: Top Down Shooter 2D 5. Building Microgamer: 1st Person Shooter 3D 6. Building Microgamer: 3rd Person Shooter 3D 7. Building Game Monetization
Educational Game Development: This program is aimed at developing game developer talents in education to accelerate innovation in learning activities in various fields and levels;	1. Advanced Ren'Py for Educational Game 2. Gamification for Teaching Materials 3. Introduction to Ren'Py Game Programming
Game Project Management aims to prepare trainees to be able to analyze the game	1. Production Management 2. Monetization

market project management and determine the direction of game development for Entertainment Games, or Serious Games and manage company business game projects;	3. Serious Game 4. Entertainment Game 5. Market & Business Analysis
Capstone Project: This program is intended as a collaborative project that integrates five streams in the curriculum with intensive mentoring to produce prototype outputs.	1. Team Building – tools & case development, design thinking, sharing mentor 2. Game Development #1 3. Game Development #2 4. Game Development #3 5. Final Product 6. Competition

The MPGD program was managed and coordinated by ICE Institute through collaboration with the 10 universities and 4 game industries.

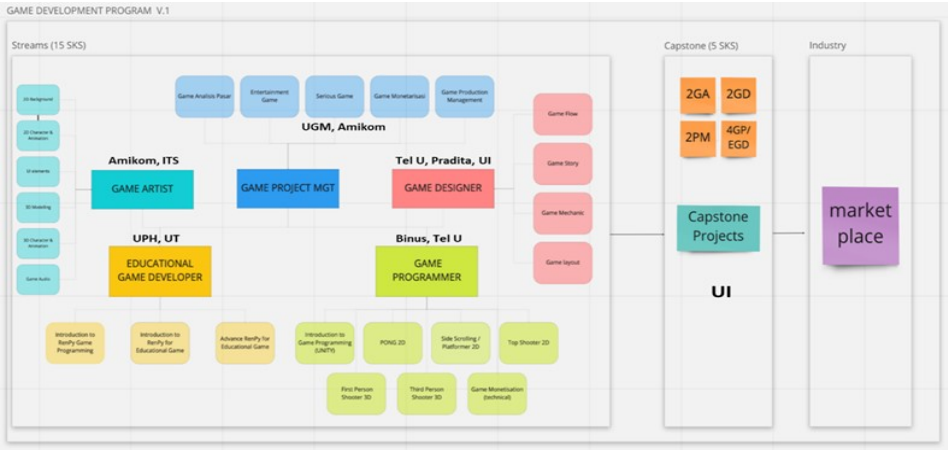

Figure 3. Collaboration among Universities for the MCGD Program

ICE Institute supported the program through the provision of software, hardware, including the virtual studio (cloud-based), and human resources to administer the program. The university provided courses and lecturers, and some tutors/mentors. Meanwhile, the game industry provided mentors and guest lecturers during the implementation of the program, and judges for the assessment of the Capstone Project.

The 1st batch of the MPGD program received funding from the Directorate General of Higher Education, Research and Technology in the form of scholarships. 672 students were selected administratively from more than 5000 applicants from 186 higher education institutions. The program was carried out from Feb. 14, 2022, up to June 30, 2022, involving 48 lecturers, 44 online

tutors, 83 mentors, 43 capstone project advisors, and 8 game developer practitioners from the industry. By the end of the program, there were 596 students received certification as game developers, and 54 games were produced.

The certificate was provided by ICE Institute in collaboration with the providing university for completion of each course, each stream, and final certification for game developers. The certificate was provided when the students met the minimum score requirements for all courses in the stream under the system set by the providing university and completed the capstone project.

1.2 EVALUATION OF THE MICRO-CREDENTIAL PROGRAM FOR GAME DEVELOPERS

At the end of the program, a program evaluation was carried out. There are several facets of the program evaluation, nevertheless, the coverage of this paper focuses on the reflection of the lecturers on the Micro-credential Program for Game Developers. The framework for the lecturers' reflection is depicted in Figure 4.

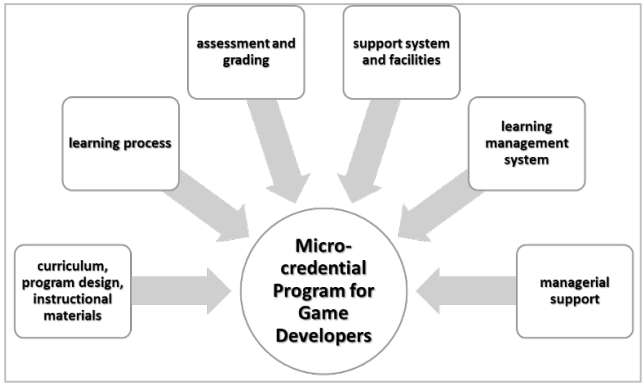

Figure 4. Reflection Framework

The MPGD program evaluation is to tap lecturers' reflections on their experience becoming lecturers of the Micro-credential Program for Game Developers, regarding the curriculum, program design, instructional materials, learning process, assessment and grading, support system and facilities, learning management system, and managerial support from ICE Institute. It is expected that the lecturers' reflection will provide input to the MPGD program as well as the management of the program by ICE Institute for improvement in the future.

2 FINDINGS AND DISCUSSION

43 lecturers from 8 universities participated in the evaluation, representing 21 courses in the program. A questionnaire of 70 Likert scale items (positive reflection vs negative reflection) was employed to tap the lecturers' reflections. Table 2 depicts the reflections of the MPGD program from 8 participating universities.

Table 2. Reflections of n=43 lecturers from 8 universities

University	Curriculum, Program Design, Instructional Materials	Learning Process	Assessment	Support System and Facilities	LMS Open-edX	Management support from ICE-I	
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Universitas Amikom Yogyakarta	3.82	3.83	3.45	3.33	2.78	3.06	3.45
Universitas Bina Nusantara	4.15	3.71	3.93	3.94	3.22	3.53	3.82
Universitas Gadjah Mada	4.13	3.67	2.82	3.67	3.43	3.00	3.49
Universitas Indonesia	3.50	3.75	3.23	3.67	3.29	3.80	3.56
Universitas Pelita Harapan	4.04	4.12	3.73	3.52	2.30	3.17	3.59
Universitas Pradita	4.26	4.13	3.87	3.92	3.75	4.00	4.08
Universitas Telkom	4.00	3.67	3.62	3.63	3.64	3.46	3.73
Universitas Terbuka	3.25	3.92	3.27	3.50	2.50	3.40	3.39
Mean	3,89	3,85	3,49	3,65	3,11	3,43	

In general, the lecturers' reflection indicates that most lecturers have positive reflections regarding their experience being involved in the MPGD program (Table 2). The highest mean of positive reflection comes from lecturers of Pradita University, while the lowest mean comes from Universitas Terbuka lecturers. While game development is increasingly popular, Universitas Terbuka lecturers' do not have previous experience in teaching or managing game development course or program. Thus far, Universitas Terbuka do not have any program related or supporting game development. Meanwhile, Universitas Pradita has study programs on information technology and visual communication design that are highly similar in nature to game development. Thus, by experience in managing education program for game developers, Universitas Pradita is relatively more experience.

The most positive reflection provided by lecturers in the dimension of Curriculum, Program Design, and Instructional Materials. This can be an indication of ownership among the lecturers,

since they were the designers of the curriculum and the program, and they were also the developers of the instructional materials for the program. They felt positive about their own work for the program, which is a very positive indication. Meanwhile, the least positive reflection is provided in the dimension of the learning management system Open EdX. This is relatively fair since the LMS Open EdX is relatively new to the higher education community in Indonesia. Most lecturers are used to having Moodle as their LMS.

In the dimension of the learning process, the most positive reflection comes from lecturers of Universitas Pradita, while the less positive ones come from Universitas Gadjah Mada and Universitas Telkom. Both Universitas Gadjah Mada and Universitas Telkom, relatively have no experience in delivering online learning or distance learning, especially for a game development program. Thus, they must have faced various initial constraints to start delivering the program. As a matter of fact, this Micro-credential Program for Game Developers is unique in terms that it is offered fully online, which has not been implemented anywhere else (Pandey, Singh, & Alabri, 2018).

In the dimension of assessment, Universitas Binus lecturers provide more positive reflection as compared to Universitas Gadjah Mada and other universities. Once again, Universitas Binus has so much experience in managing online learning programs, while Universitas Gadjah Mada is relatively a strong conventional university. For the dimension of support system and facilities, Universitas Binus lecturers provide more positive reflection as compared to Universitas Amikom Yogyakarta. This also an indication that Universitas Binus has more experience in managing online learning as compared to Universitas Amikom. Further, in terms of management support from ICE-Institute, lecturers from 8 universities reflected positively. Although, less positive reflections were expressed by lecturers from Universitas Amikom. It is assumed that lecturers' experience in managing online learning, especially in a game development program that was offered fully online, has been the factor for positive or less positive reflection.

Table 3 depicts the lecturers' reflections on their experience of managing and delivering the courses within the MPGD program.

Table 3. Reflection of Course Lecturers

Course	Curriculum, Program Design, Instructional Materials	Learning Process	Assessment	Support System and Facilities	LMS Open-edX	Management support from ICE-I	Total Skor
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Game 2D Character and Animation	3.88	4.67	4.09	3.50	2.50	2.00	3.50
Market and Business Analysis	4.75	4.25	3.91	4.50	2.86	2.60	3.84
Capstone Project	4.13	3.88	3.57	3.96	3.11	3.50	3.77
Gamification for Teaching Materials	3.66	4.03	3.55	3.25	2.51	2.85	3.42
Game Audio/ Audio Engineering	3.13	3.42	3.45	3.00	2.36	2.40	3.01
Game Flow	4.26	4.13	3.87	3.92	3.75	4.00	4.08
Game Layout	3.00	3.50	3.00	3.17	3.36	4.00	3.31
Game Monetization	3.91	3.54	3.43	3.46	3.18	3.00	3.51
Game Production Management	3.38	3.33	3.27	3.17	3.36	3.60	3.42
Advanced RenPy for Educational Game	4.13	3.78	3.96	3.53	3.82	3.60	3.84
Game mechanic	3.88	3.83	3.64	4.17	3.93	4.00	3.90
Game Story	3.63	3.34	3.00	3.42	3.50	3.50	3.42
Game UI/UX	3.82	3.63	3.28	3.34	2.86	3.60	3.50
Developing Entertainment Game	3.75	3.92	2.73	3.17	3.00	3.20	3.31
Game 3D Character & Animation	3.25	3.08	3.00	3.00	3.00	3.00	3.11
Introduction to RenPy Game Programming	4.19	4.23	3.84	3.79	2.09	3.35	3.69
Intro to Unity Game Engine	4.75	3.33	4.64	5.00	4.86	5.00	4.59
Game PONG 2D development	3.88	4.00	3.91	4.33	3.14	3.20	3.86
Top Down Shooter Development	4.50	3.92	4.00	4.33	1.86	3.40	3.82
Serious Game	3.96	3.86	3.45	3.50	3.00	3.40	3.62
Game Side Scrolling/Platformer 2	4.44	4.00	4.18	3.34	2,75	2.80	3.68
Mean	3.94	3.79	3.06	3.66	3.09	3.33	

Table 3 provides information that once again LMS Open EdX received the least positive reflections, since lecturers were not yet familiar with the new LMS employed by ICE Institute for the MPGD program. Meanwhile, the dimension of curriculum, program design, and instructional materials receives the most positive lecturers' reflections, which once again depicts the ownership of the lecturers to the MPGD program. Table 3 also shows that the highest positive reflections on

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most dimensions come from lecturers delivering the course in the *Introduction to Unity Game Engine* which provides students with the basic knowledge and skills in game development.

The less positive lecturers' reflections can be seen in several dimensions for several courses. The lowest positive reflection comes from lecturers of the *Top Down Shooter Development* course for LMS Open EdX. According to the lecturers, not all instructional materials can be delivered via an online course, and some competencies are better taught through face-to-face conventional teaching. Further, the less positive lecturers' reflections also come from lecturers of *Introduction to RenPy Game Programming* course, *Game Side Scrolling/Platformer 2* course, *Game UI/UX* course, *Developing Entertainment Game* course. Most less positive lecturers' reflections focus on the LMS Open EdX dimension, while others focus on the dimension of management support from the ICE Institute. These are concerning issues that need to be well-responded through the improvement of the MPGD program for the following offerings.

The lecturers also reported some concerns regarding the PMGD program, specifically in terms of the learning process, that participants of the PMGD program are expected to have computer and information technology backgrounds. Since some materials are more related and supported by the mastery of computer and information technology backgrounds. Lecturers also reported their struggles to activate students in online courses. The online engagement was difficult to initiate and maintain, according to the lecturers. *"Online pedagogy is different from traditional face-to-face teaching and learning; in the online environment, students and teachers are separated. It is a challenge to engage students."* As such, lecturers also reflected that they have to transform their pedagogical approach when they are delivering online courses, and it was very challenging for them.

3 CONCLUSIONS

The Micro-credential Program for Game Developers is a new program in various aspects. The curriculum as "micro-credential" for creative work based on the double diamond framework is relatively new. Further, the MPGD program being delivered in a fully online mode is also new to the program. Furthermore, various dimensions of the MPGD program, including the use of the cloud-based virtual studio, present novelty to the administrators, lecturers, as well as students.

Evaluation of the management of the 1st batch MPGD program has been carried out to tap into lecturers' reflections on six dimensions of the MPGD program regarding curriculum, program design, instructional materials, learning process, assessment, support systems and facilities, and

management support from the ICE Institute. The evaluation has indicated mostly positive reflections of lecturers involved in the MPGD program. However, there are some factors of great concern for the improvement of the MPGD program, including the LMS Open EdX, and the transformation of the pedagogical approach for online delivery of the MPGD program. This calls for actions from ICE Institute as the coordinator of the MPGD program, as well as the participating universities to provide empowerment for lecturers in the reported areas for the betterment of the implementation of the MPGD program.

Further and deeper evaluation of the MPGD program will be needed to provide a comprehensive picture of the MPGD program and room for improvement. The MPGD program is a potential program to answer the challenges of developing Indonesia's creative industry in the future.

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