Strengthening the Competencies of Gen-Z Students as Future Change Agents: Learning from Extension Science and Communication of Innovation Course (KPM121C)

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***Abstract*—The rapid development of communication and information technology is capable of supporting the learning and teaching process in higher education. This leads to the consideration of self-evaluation by the course team teaching "Extension Science and Communication of Innovation". Therefore, the research aimed to develop the course best suitable to equip Gen-Z (Z Generation) students with future change agents' skills. In this development process, the teaching team engaged in a competitive learning innovation known as Hibah Kompetitif Inovasi Pembelajaran (Competitive Grant for Learning Innovation) at Institut Pertanian Bogor (IPB) University, also known as Bogor Agricultural University, through an experiential approach modified with an action research model. In addition to face-to-face meetings, the team uses Learning Management System (LMS) to plan, monitor and assess student performance. Several data were also obtained from the course, including curricula, learning contents, and students' projects. Moreover, the context, input, process, and product evaluation models were used for the analysis. The results showed that the learning and teaching transformation adjusted from course content fulfilment to strengthening the students' competencies. Based on the HKIP-based evaluation, the score for course performance also improved from 75/93 to 85/93. To strengthen students' competencies, the teaching team updated learning outcomes, completed course regulations and documents, documented academic experiences, and co-operated with technical staff for more effective use of LMS. From the results, the teaching team also implemented additional approaches to develop the skills of students, including (1) practicing collaborative learning, (2) learning from real-world situations, (3) group projects based on problem-solving, and (4) mixed media for extension education. In this case, the regular adjustment of the course to present and future challenges assisted the students in meeting the learning outcomes.**

***Index Terms*—Agricultural extension, change agents, learning innovations, skills**

I. Introduction

The alignment, updating, and development of courses are essential to help students master the expected competencies. This indicates that an undergraduate course, the Teaching Team of Extension Science and Communication of Innovation (KPM121C), periodically reviews its content suitability with the present development and the needs of Gen-Z (Z generation) students. From this context, the interpretation of Gen-Z essentially needs to be clarified. Based on the literature, Gen-Z were used to emphasize the group of people born between 1997 and 2012. A subsequent definition also describes Gen-Z as a "multiple-multimedia" generation [1], due to their implementation of various information media, such as text, images (visual), sounds (audio), or video (audio-visual). This definition considered the digital media existence, which affected the behaviors of the Gen-Z members. The Gen-Z is also considered the generation as "early adopters" of digital innovation [2]. This proved Gen-Z members were the digital natives having different needs, interests, and learning preferences from other generations [3], accompanied by the possession of visual and kinesthetic adaptation styles [4].

There are twelve challenges impacted the preparation patterns of higher institution students for the future [5]. These challenges included, (1) worldwide economic competitiveness, (2) changes in the economic and financial scene, (3) new political landscapes, (4) changes in the social scene, (5) transformation in industrial demands, (6) adjustments in business and services, (7) new patterns of consumer behavior, (8) globalization, (9) IT trends, (10) the proliferation of innovations, (11) changes in workplace demands, and (12) transforming the expectations of employers. Based on KPM121C, changes have been experienced for more than fifteen years, specifically in learning content development, enriching knowledge sources, innovative educational approaches, and more use of the project multimedia [6]. Despite this, the rapid development of communication and information technology still contributes to innovation in diverse fields. In agricultural extension, for example, communication and information technology is used by extension workers as a medium for channeling messages or data from and to the farmer community and vice versa [7–9]. This explains that digital technology is capable of supporting the learning patterns of Gen-Z students [10].

The use of mobile applications and Learning Management System (LMS) has also increased in the last few years due to the need for efficient and effective knowledge and skills acquisition methods [11, 12]. Furthermore, several reports on the use of digital technology for learning and extension, such as [9, 13–16], suggested that community engagement was very crucial to enhance learning effectiveness. This showed that the engagement of students, specifically millennials, required a specific fulfilment approach. From this context, three tips for communicating with millennials were observed, namely (1) Using the platforms already implemented, such as Instagram, Facebook, etc, (2) Maintaining short interactions, and (3) Conducting a two-way conversation [9].

In Indonesian higher education, lecturers have three main

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tasks (Tri Dharma), namely education, research, and community service (outreach and extension). As educators, they always have to design materials to equip students with the required future skills. However, a few lecturers lack teaching capacity, including the limited skills to develop a course [17–19]. This indicates the need for them to study the patterns of updating and developing a course that is relevant for students. Based on the needs of lecturers, the concept to develop learning and teaching is popularly known as a learner-centered approach. This shows that the learning paradigm has transformed from a conventional (teacher-centered approach) to a student-centered approach, to ensure the fulfilment of the course for students' needs [20].

To strengthen students' competencies, the teaching course adopts the initiative to evaluate present practices. From this context, the self-evaluation of the course aims to determine the aspects requiring improvements toward assisting students to learn better and grasp the skills needed as future change agents. In managing the course, the coordinator and the team members should have development agreements and consider the implementation of appropriate communication and information technology relevant to the learning objectives. In 2021, the competition grant on learning innovation managed by the Directorate of Program Development and Education Technology, IPB University was conducted. After passing the selection stage, the patterns of enhancing the course suitable for students to learn better in the future were explored and evaluated. Therefore, this research aims to self-evaluate and improve the course taught to students. It also aims to share the learning experience obtained in improving the course presented to Gen-Z students. The results acquired are expected to contribute to the development of educational research from the perspectives of lecturers.

II. Theoretical Framework

The implemented theoretical framework emphasizing the theory of agricultural extension, communication of innovation, and learning transformation is described and evaluated in this study. The theory of agricultural extension and innovation communication was initially established in the early 20th century across many countries, to provide and support farmers with information, as well as the adoption of new farming technologies and practices [20–24]. Periodically, agricultural extension services have evolved to incorporate a range of communication and dissemination strategies, including mass media, farmer field schools, participatory approaches, and digital technologies [12, 25, 26].

As practices to facilitate change, extension or advisory services have developed in diverse fields, such as the agricultural, social [9, 27, 28], health [29, 30], education [6, 11, 20, 31], environment [26, 32, 33], and other relevant sectors. Extension also emphasizes the development of awareness, knowledge, and skills, through the suitable learning model designed based on problem-solving needs. From the extension and advisory services, the outputs obtained are often observed through various indicators, such as better household income, community (social stability), health services, and environment [27, 34–36]. Furthermore, extension as a science has been integrated with other disciplines, including Communication, Education, Psychology, Sociology, Biology, Environment, Economics, and Business. This explains that a transdisciplinary approach is responsible for presently influencing the development of extension services. In this case, the framework for the course development [37] should consider a broader view of extension as not just about the micro aspect of agriculture. However, agriculture has connectivity with society, communication, economics, culture, business, policy, and the environment.

Based on the present issues in various fields, future reports of extension education are expected to be very challenging. For example, the regeneration of a previously analyzed agricultural topic, due to the decrease in resources quality, as well as the complex issues associated with people, policy, natural resources, and developmental approaches [34, 36, 38]. To resolve these issues, the university needs to prepare the student with future competencies. Furthermore, Indonesia has a population of approximately 153 million in the range of productive age, with only 60% of them observed to have digital skills. In the last two years, several analyses have reportedly emphasized an increased demand for creativity, originality, initiative, and complex problem-solving skills [39].

To adapt to the future workplace, university graduates majoring in extension or development communication-related fields should be equipped with hard and soft skills. Besides, students also need to develop critical thinking, creativity, communication, and collaboration skills in the digital era. To resolve the challenges in self-reliance community empowerment, the objectives of KPM121C should empower various features, namely problem-solving capacity improvement, and communication of innovation. leadership, program planning and evaluation, media development with community-oriented content, and facilitation skills. From this context, one strategy commonly implemented to enhance the competence of students emphasizes the maintenance and development of teaching excellence and learning innovation [40]. Fig. 1 shows the three elements supporting students' learning, namely curriculum design, teaching strategies, and technology integration.

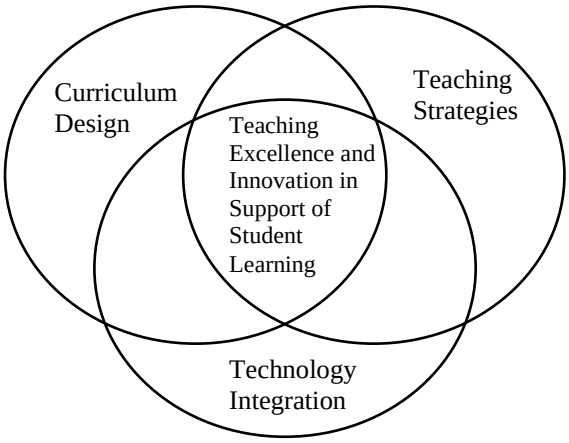

Fig. 1. Elements to redesign course outcomes for supporting student learning [40].

Learning and teaching are mostly managed through blended education, which is the integration of selected

complementary face-to-face and online approaches/ technologies [41]. In the era of the internet of things, most educational institutions have practiced blended learning, to help students reach course-learning outcomes. Since this learning method is versatile [42], educators need to carry out selection processes from various choices, depending on the context and outcomes set for academic achievement.

The achievement of learning objectives should also be evaluated through several evaluation models. This leads to the consideration of Context, Input, Process, and Product (CIPP) Evaluation Model, which is very simple to measure the educational program from its product [43]. It also consists of four complementary evaluation sets, where the first three elements are useful for improvement-focused or formative assessment reports. Meanwhile, the fourth element, the product approach, is relevant for summative analyses [44, 45]. This shows that the four evaluation sets in the CIPP Model contribute to the improvement and accountability of the program. From the evaluation outputs, various decisions are expected to be developed for the program, regarding termination, modification, continuation, or installation. A weakness of the CIPP Evaluation Model also prioritizes the identification of the output or learning objectives as the focus of assessment, leading to a problem during the non-consideration of the first three program aspects.

To enhance the competencies of students, a learning approach emphasizing the suitable needs and skills for future challenges is a necessity. Based on the student and workplace demands, experiential learning approach and curriculum should be able to develop the competence of academic citizens [6]. Moreover, the learning environment needs to greatly determine the success of students, regarding skills development in innovation and problem-solving fields [6, 46].

KPM121C emphasizes the extension science from agricultural and non-agricultural development. It also introduces the students to the following features, (1) extension science and communication of innovation, (2) extension paradigm adjustment, (3) learning theory and its practice, (4) innovation theory diffusion, (5) program planning and evaluation of extension/communication, and (6) extension policy. To resolve the future challenge, the team teaching should review the course content based on recent developments, the type of present students, anticipated needs, diverse learning methods, media implementation, and educational technology.

III. METHOD

The teaching team used an experiential learning approach to transform KPM121C. This was because the approach emphasized the importance of learning through first-hand experiences. Furthermore, the team engaged in problem identification, innovative learning development, transformation observation, and feedback provision for subsequent course improvement actions. In the experiential approach, the learning process contained four stages, including concrete experience, reflective observation, abstract conceptualization, and active experimentation [47, 48]. The approach was also depicted as a popular element known as Kolb Learning Cycle (KLC), as shown in Fig. 2. From this context, KLC indicated that learning involved the entire thoughts, feelings, and actions of people.

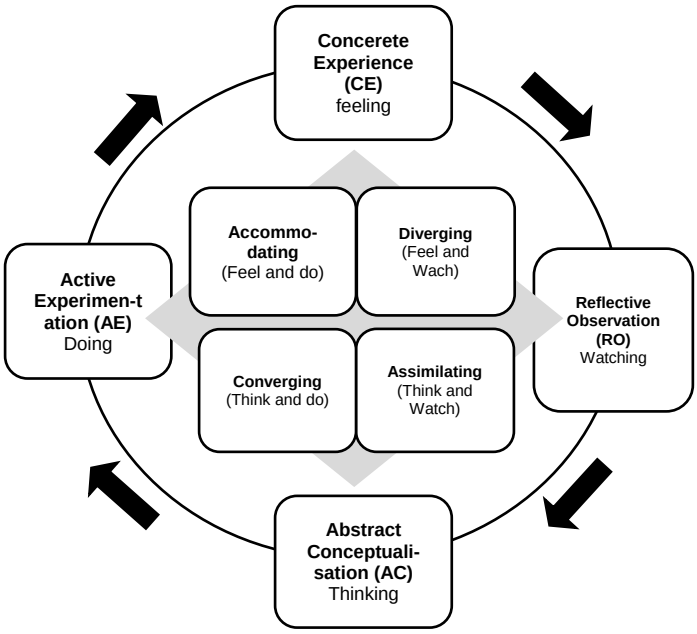

Fig. 2. Kolb learning cycle [20, 48, 49].

To apply the experiential learning approach, the main objective prioritized in-depth analytical performance, to obtain deeper insights into the better academic process of Gen-Z students. In using KLC, the following steps were implemented, (1) Identify the situation of the KPM121C course relevant to the research question, to improve the course performance and equip Gen-Z students with hands-on skills, (2) Conduct the analysis, as well as review and evaluate the course document through the implementation of the appropriate instrument, (3) Reflect on the analysis, regarding the academic outputs, innovation, and Gen-Z skills development obtained from the learning transformation experience, (4) Analyze the experiential data and link the analysis with learning innovation, (5) Draw conclusion on the patterns by which the learning approach effectively and efficiently facilitated Gen-Z students and new ideas for future analysis.

In this research, the analytical process complied with the action research model (Fig. 3) as the protocol. This model was depicted as a spiral containing three main stages, namely plan, act and observe, as well as reflect [50, 51]. Based on the planning stage, the teaching team identified the issues, determined the research objectives, and evaluated the data collection method for course development. The team also agreed to work cooperatively, to develop the course toward equipping Gen-Z students with future skills. This was accompanied by the act and observe stage, where the team implemented the action plan and developed course improvements regarding the needs of students. Besides, the team also monitored the occurrence of changes, with the contexts, inputs, processes, and products of KPM121C being evaluated through the CIPP model. The final stage emphasized reflection, where the team prioritized the learning innovation outputs obtained from the course, for subsequent improvement. To strengthen students' competencies, the performance insights were also used to

inform future projects.

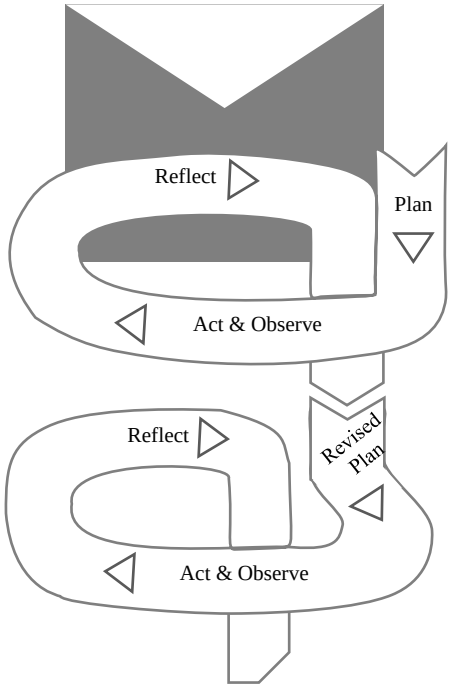

Fig. 3. Action research model [20, 50, 52].

Based on the results, the following activities were responsible for developing KPM121C, (1) reformulating the learning outcomes, (2) documenting the semester course plan, including the learning materials, (3) reviewing the course content, (4) documenting the practicum materials and students' projects, (5) assessment rubric, and (6) self-evaluation of the course performance, by using the criteria from IPB University. To evaluate the course, the Context, Input, Process, Product (CIPP) model was used to analyze improvement levels before and after the program (Fig. 4).

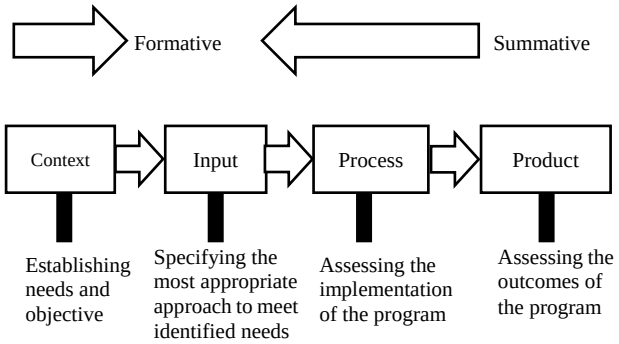

Fig. 4. CIPP model of evaluation [53].

In this research, data were obtained from the self-evaluation conducted by the course coordinator, through the toolkit of the Directorate of Development Program and Educational Technology IPB. The component of the instrument also contained seven dimensions and twenty-five indicators, as shown in Table I.

The instrument to evaluate course learning innovation and performance was constructed by the Team from Directorate for Development Program and Educational Technology in early 2022, based on the collaborative educational principle and innovativeness [54]. This instrument was externally tested for its validity and reliability before experimental implementation. A total of 30 educational experts were also involved for the measurement and provision of inputs. In addition, the instrument was used to evaluate more than 313 courses at IPB University in 2022.

TABLE I: INSTRUMENT TO EVALUATE COURSE LEARNING INNOVATION DAN PERFORMANCE

Dimension	Indicator	Total Item per Indicator
Course information	6	24
Information about the educators	2	8
Technology and infrastructure for collaborative learning	3	10
Course content (learning materials)	4	15
Collaborative interaction	4	15
Assessment	4	13
Evaluation and feedback	2	8
	25	93

Source: [54]

The experimental team also obtained data and information from course documents, as well as the discussions with the teaching workforce and the projects of students. In this context, the personal data of the research participants were not disclosed, with their identities remaining protected. This ethical aspect was subsequently applied in the learning process evaluation, where the teaching team considered privacy matters as the authors. Moreover, data were qualitatively analyzed to emphasize the outputs capable of improving the course. The insights were also considered to prioritize the experiential learning journeys.

IV. RESULT AND DISCUSSION

This section consists of three sub-sections, namely the self-evaluation of KPM121C through the CIPP Model, as well as course development and assessment.

A. The Context: Course Overview

Based on the results, KPM121C (Extension Science and Communication of Innovation) course was compulsory for Undergraduate Degree students majoring in Communication and Community Development. Besides being grouped as Academic Core Course in the K2020 Curriculum of IPB University, KPM121C also developed the competencies of students toward performance as change agents or advisors in their future careers. From this context, the course was designed for the development of innovative communication events or extension/advisory services, counselling, or non-formal education program. Based on potential, interests, and talents, students enhanced their hard and soft skills through lectures and practicums, to achieve learning outcomes. Several professions considered relevant to the substance and process of KPM121C also included advisors, program planners, policy analysts, social workers, facilitators, coaches, trainers, teachers, and counsellors.

From the results, the course content had been transformed since early 2005. However, the agricultural extension course for Undergraduate Degrees was managed in four IPB departments before the beginning of 2005. This included the

Departments of Socioeconomics of Agriculture, Fisheries, Animal Sciences, and Forestry Management. From this context, the Department of Communication and Community Development Sciences had been managing the extension science course since 2005. Moreover, the course content was adjusted towards encompassing extension science and agricultural innovation communication, as well as other related fields such as the social, environmental, and business sectors. Table II shows the summary of KPM121C profile before and after the content update.

TABLE II: THE COURSE KPM121C PROFILE BEFORE AND AFTER UPDATING THE CONTENT

Description	Before	After
General topics discussed	Understanding extension, history, principles of learning and communication, innovation adoption, program planning and evaluation, policy, and global advisory services	The topics have been updated considering the use of digital technology in extension and other environmental advisory services as the case study
Practicum	More analytical	Analytical and creativity to develop media communication for extension-education as the Group Project
Availability of guest lecturers from practitioners	Rarely inviting guest lecturers	Guest lecturers/practitioners are invited to share experiences in the course
Assessment	Examinations, task, practicum, and participation	Student participation/engagement, group projects, quiz, and practicum
Learning platform	Classroom and field	Multiple platforms for learning

According to the context evaluation for KPM121C, the workplace, such as government and international agencies, civil society organizations, the private sector, and industry, recruited candidates that were competent in various aspects. These aspects included program planning and evaluation, extension field services, community engagement, training, and capacity-building event. When candidates studied KPM121C with the application of the required knowledge and skills, several benefits were observed for their workplaces and universities. The course also employed the problem-based learning (PBL) approach, specifically in the final assignment. Therefore, students had the experience of identifying, analyzing, evaluating, and providing alternative solutions relevant to the context. These kinds of skills were often required during the performance of "Student Service-Learning Program" or *Kuliah Kerja Nyata Tematik* (KKNT) in Indonesia Language (Bahasa) in Semester 7. This learning program subsequently implemented a PBL approach, which was promising due to the elevation of graduate employability.

1) Input

The input for assisting students to reach their academic competencies included the following, (1) the learning and teaching plan, (2) the time contributed to learn, (3) assignment completion, (4) group project contribution, including short video for extension and innovation communication, (5) the time contribution of lecturers, (6) distribution of handouts as a guidance for the students, (7) infrastructure, (8) consultation time, (9) practicum, and (10) support system. During the COVID-19 pandemic, IPB University supported all lecturers and students with the Zoom Account Pro, for learning, teaching, and other related activities. In this institution, each department and faculty also developed a mini studio for academic, student, and staff activities. In addition, IPB University and the Ministry of Education & Culture provided internet communication vouchers for students in 2020-2021.

In this research, three aspects were categorized as the input allocated for learning and teaching KPM121C, as shown in Table III. These aspects included human resources, time allocation, and support system.

TABLE III: INPUT ALLOCATED FOR THE KPM121C IN ACADEMIC YEAR 2020–2021

	Before year 2019	After year 2019
Human resource		
(i) Lecturers	Three lecturers	Four lecturers
(ii) Assistant lecturers	Two assistant lecturers	Three assistant lecturers
(iii) Supporting staff	One supporting staff	One supporting staff
Time		
(i) Time allocated by the lecturers	84 hours (preparation, updating learning contents, teaching, assessment, and evaluation)	70 hours (preparation, updating learning contents, teaching, assessment, and evaluation)
(ii) Time allocated by the students	48 hours (participating in the class, assignment, practicum, examination)	50 hours (participating in the class, assignment, practicum, group projects, final workshop for the assessment of group project
(iii) Time allocated by assistant lecturers	42 hours (preparation, facilitating the students in practicum, group discussion, presentation)	42 hours (preparation, facilitating the students in practicum, group discussion, presentation)
(iv) Cost allocated for the course by each student	in average: IDR625000 per student	in average: IDR700000 per student
Support system		
(i) Learning Management System (LMS)	LMS was used for specific purposes	LMS was used more intensively
(ii) Infrastructure	2 and 4 classrooms for lecturing and practicum (offline), respectively	2 and 4 classrooms for lecturing, as well as practicum, online learning, respectively, through LMS, zoom, and other digital apps

Source: Authors

2) Process

Based on the results, KPM121C applied a mixed method to enhance the understanding of students about course substance. This led to the acquisition of knowledge from learning and teaching activities, students, and other

recommended sources. Besides varying regarding the extension/advisory services books, scientific articles, and relevant websites, the learning sources also emphasized the field of community education. This indicated that around 135 to 145 students enrolled for the course and were facilitated by five main and two guest lecturers yearly. The weekly learning management was also 2×50 and 3×50 mins for lectures and practicum, respectively. From this context, four classes of practicum were observed and managed for the course, each containing 25 students facilitated by a lecturer. In this process, the activities included brainstorming, discussion, case study analysis, field observation, a group project on innovative extension, and a workshop. Students were also very active in group projects, to help the community solve problems as change agents. In addition, the engagement of students increased their performance in the learning activities suitable for their academic styles [55].

3) Product

According to the results, students enrolled in KPM121C should work in groups to produce content and media relevant to a specific contextual issue. This was because the course had assigned students to plan and produce content for extension-education materials in the last three years, regarding the rapid use of multimedia. In this case, students applied the principle of planning and designing messages based on community needs. The selected content and media were also reviewed by the main and assistant lecturers before completing the assignment. From this context, the criteria of the assessment included rationale, suitability, creativity, and innovative aspects [37]. Students were also required to formulate content through specific media communication, with a 3-minute maximum video. Furthermore, the final assignment of the video was evaluated by using rubrics and peer group assessments. Regarding the group product, the criteria to measure the final output were the relevancy, message clarity, collaboration, and ability of students in explaining the KPM121C content. This indicated that the topics of student projects included food and agriculture, healthcare, nature, environment, and intercultural communication education.

B. Course Development

Based on the results, KPM121C transformed the learning approach from content-based to student-oriented, toward improving the achievement of academic outcomes. This indicated that the course was gradually updated with new cases in extension and innovation communication, future challenges, and more attractive learning activities. In 2019, the learning module was intensively implemented through the course.ipb.ac.id., with various challenges encountered due to the non-capitalization of the available features by several people. This showed that the university had trained the staff to increase their skills in using the digital platform. At the university, the collaboration of the Human Resources Development Directorate and the Information System and Digital Transformation Directorate also developed a program for the academic and technical staff, to effectively and digitally implement LMS. Moreover, the teaching team of KPM121C managed the communication media needed, including the WhatsApp group, Zoom, and Google Meet's courses. This was conducted to aid the synchronized and unsynchronized learning processes of the students.

Based on the results, RPS (Semester Learning Plans), RPD (Online Learning Plans), learning contracts, Practicum Events Units, and assessment rubrics were prepared by the teaching team. This indicated that the assessment mechanism was evaluated with students at the first lecture/practicum meeting. To build competence as Change Agents for the Future, Gen-Z students need to be equipped with specific skills. When carrying out community service activities or field works, change agents were capable of handling various people from different regions and socio-economic cultural conditions. In this case, learning innovations in KPM121C contained the following areas,

(a) Updating the course content and including the aspects of communication and information technology in the learning process, specifically through LMS.
(b) Designing more varied and flexible learning methods, to develop the power of innovation, creativity, and collaboration among students. The teaching team should also assign students to develop content for extension education, through specific media for various community groups. From this context, the substance needs to be considered for community needs and delivered via appropriate accessible channels. In addition, students should conduct joint performance as part of a collaborative learning strategy.
(c) Assessing learning outcomes based on various aspects, namely the active involvement, process, and group work outputs (project/case study) of students. This prioritized the development of counselling materials and innovative communication according to community needs, quizzes, discussions, and exams. From this context, the largest proportion of assessments was 50% for group activities and work (50%).

Based on the results, the change of the course name in 2019 was accompanied by updating the content in line with the present development and future challenges. This indicated that all course topics were complemented by the distribution of handouts used for subsequent study by students. In 2019, the task of the project group also emphasized communication of innovation for problem-solving or extension services, by using modern media to actively engage students' learning process [13, 41, 56]. Moreover, students of KPM121C presented the group project in the workshop class, where everyone was actively engaged. From this context, the assessment was carried out by the peer groups of students and lecturers. This was in line with the conveyance of KPM121C, where learning was transformed from a teacher-centered approach to a student-oriented type. The theoretical aspect relevant to this phenomenon was also the transformative learning from Mezirow [57, 58]. This proved that students experienced changes in the cognitive aspect and learning style. They were also more active and open to dialogues, as well as showed a willingness to learn from others.

C. Result of Course Assessment

Based on the results, an increased performance was observed for KPM121C before and after coaching assessment from 75/93 to 85/93, through the toolkit of HPKEM/HKIP with similar indicators (Figs. 5 and 6).

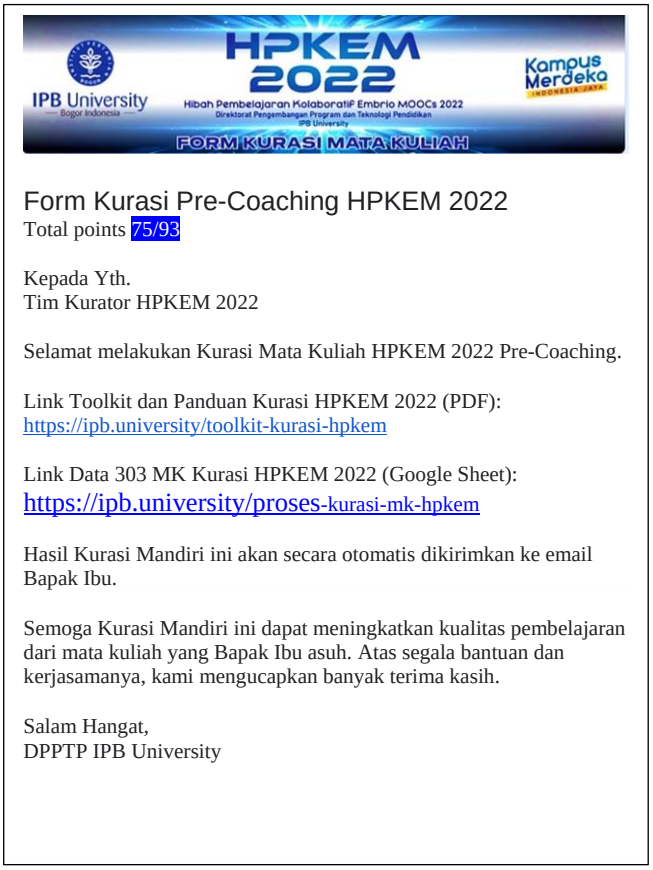

Fig. 5. The results of course assessment using the HPKEM toolkit 2022. Note: HPKEM stands for Hibah Pembelajaran Kolaboratif Embrio MOOC (Grant for Collaborative Learning Embryo Massive Open Online Courses).

Fig. 6. The results of course assessment using HKIP toolkit 2022. Note: HKIP stands for Hibah Kompetitif Inovasi Pembelajaran (Competitive Grant for Learning Innovation).

Fig. 7. The front page of LMS the Course KPM121C as of December 2022.

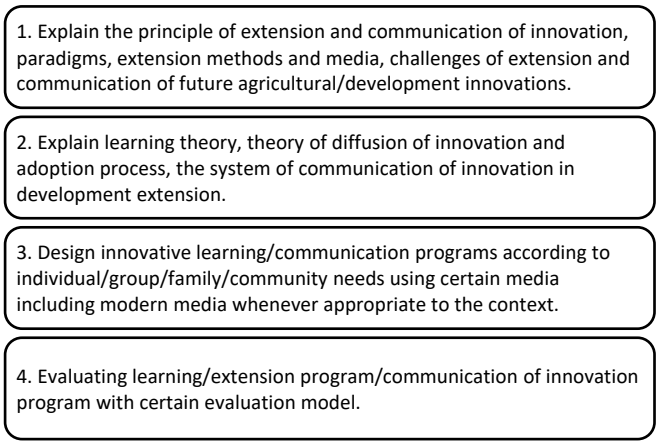

Fig. 8. The learning path for students undertaking KPM121C.

From the results, the coordinator self-assessed the course by using the HKIP facilitator toolkit before the coaching session, obtaining a value of 75/93. In this case, some of the indicators included, (1) the use of learning media (online), (2) journaling, (3) Turnitin implementation for assessing the submission of students, and (4) technology and learning infrastructure. Besides, the coordinator also provided inputs and advice to improve the course as required. After being involved in mentoring and coaching HKIP, KPM121C improved course documents by integrating learning activities through digital technology. Figs. 7–9 show examples of the course website in IPB LMS, as observed in December 2022. The self-assessment of the course also led to a score of 85/93 at the end of the coaching session of HKIP, indicating that the documents of RPS, RPD, and Rubric (Course Assessment Mechanism) were completed. In addition, the course information, teaching team, and evaluation were clear and included in LMS. From this context, two items required a follow-up, namely media-assisted learning module and student journaling or self-reflection on the academic journey.

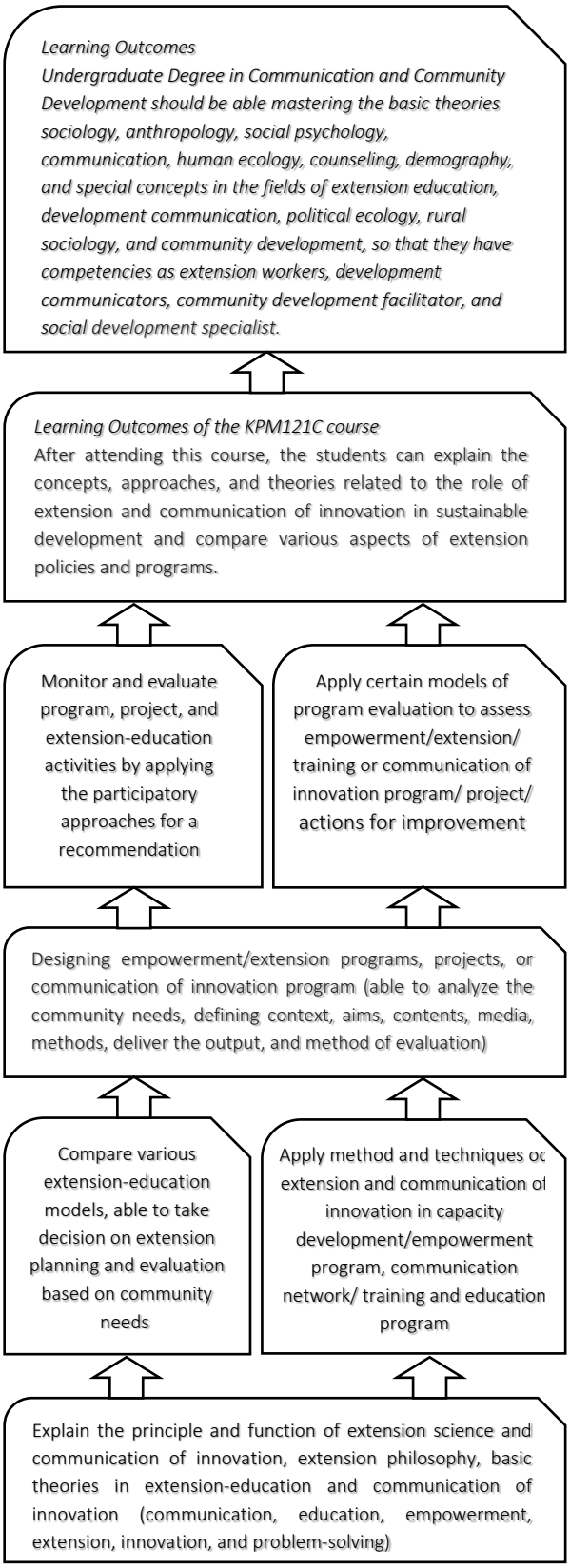

Fig. 9. The course KPM121C learning outcomes.

Based on the results, the team activities from the coaching session were an experiential learning process [42, 47], which transformed the academic practice for the course. This indicated that a collaborative group project was practically assigned to students, to strengthen the critical thinking, creativity, communication, and collaboration skills of Gen-Z students. The project also encouraged them to learn from real-world situations, by using specific theories from KPM121C [37]. In the first semester of the 2022/2023 session, students from other universities enrolled in the course as part of the credit-earning program. This initiative was in line with the National Policy of "Freedom to Learn-Independent Campus" (Merdeka Belajar Kampus Merdeka). Most of students were also from the western and eastern Indonesia, with their enrolments enriching relevant discussions and enabling learning processes from various cultural backgrounds. From these results, innovative learning required the engagement of the educators and learners in the entire educational process. The integration of the Gen-Z academic style into teaching and learning activities also led to the achievement of expected outcomes.

V. Conclusion

This research emphasized the self-evaluation of the KPM121C (Extension Science and Communication of Innovation), which was taught to the Gen-Z undergraduates. It also aimed to share learning experiences in improving the course, to assist Gen-Z students toward the achievement of better learning outcomes. Based on the results, the experiential learning process and action research model were employed by the teaching team to improve academic practices. The team also worked together to transform teaching practice and participated in the learning innovation program at IPB University. From this context, the institutional toolkit implemented for the assessment of learning innovation was used to evaluate the course containing 7 dimensions and 25 criteria, with the maximum total score being 93. These dimensions included the following, (i) course information, (ii) information about educators, (iii) technology and infrastructure for collaborative learning, (iv) course content (learning materials), (v) collaborative interaction, (vi) assessment, and (vii) evaluation and feedback.

From the results, the score on the course assessment increased from 75/93 to 85/93, before and after the experimental actions, respectively. This showed that the actions implemented for the course improvement prioritized information completion and content upgrade for future contexts, synchronized and unsynchronized academic platforms, problem-based approach assignments, collaborative group projects, and peer assessments. Moreover, two criteria were observed and implemented for KPM121C for future improvement, namely a media-assisted learning module and student journaling/self-reflection on the academic journey. The results also showed that the developed learning transformation enabled the teaching team to assist students in strengthening their hard and soft skills for the subsequent carrier. These skills included critical thinking, problem-solving, creativity, communication, and teamwork. Innovative and collaborative learning was also a powerful educational approach, which developed benefits for both students and educators. From this context, students engaged in active and personalized learning, as well as enabled dialogues and consultations with peers and the teaching team. This learning atmosphere allowed them to exchange ideas, obtain new perspectives, and build very strong relationships capable of extending beyond the classroom.

Based on these results, the implementation of effective

innovative and collaborative learning required careful course planning, good teamwork, administrative support, infrastructure, and continuous improvement. As a contemporary approach, this study contributed to science education to improve course performance, with the educators conducting self-assessments. Subsequent reports on the improvement of learning quality in higher education were also needed, including tertiary academic partnerships.

CONFLICT OF INTEREST

The authors declare no competing financial interests, affiliations, or personal relationships with any organization, which are capable of influencing the work reported in this paper.

AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: Siti Amanah conducted the research based on the concept, design, methodology, implementation, data analysis and interpretation, supervision, as well as manuscript preparation and write-up to the finalization for publication. Dwi Sadono contributed to data collection, course reviewing, and analysis. Anna Fatchiya engaged in course evaluation and data analysis. Titania Aulia conducted the data collection, analysis, and interpretation. Asri Sulistiawati contributed to the review of the course document and analysis. Annisa Utami Seminar contributed to data collection from the classroom and practicum. All authors reviewed and validated the results, as well as approved the final version of the manuscript.

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