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**Integration Of Artificial Intelligence As A Training Module  
At The College Business Incubator**

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**Abstract:** This study examines the integration of Artificial Intelligence (AI) as a training module in university business incubators. The case study was conducted at the Business Incubator of the Nobel Institute of Technology and Business Indonesia using a descriptive qualitative method. Data were collected through in-depth interviews, participant observations, focus group discussions, and document analysis from 60 stakeholders. The results show that AI integration has a positive impact on the learning and development process of startups in business incubators, with 60% of startups reporting significant changes in business models. Key challenges include gaps in AI adoption among participants and ethical concerns regarding data use. The research results in recommendations for more effective incubator program design, including an adaptive AI curriculum, the integration of AI ethics, and a holistic approach in business development. This study contributes to the understanding of the role of AI in entrepreneurship education and the development of the startup ecosystem in Indonesia.

**Keywords:** Artificial Intelligence; Business Incubator; Training Module.

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**A. Introduction**

It is undeniable that the role of Artificial Intelligence (AI) in recent years has changed the strategies of various industries,

including education and entrepreneurship. This development can be seen in the following table (Chen et al., n.d.; Newell & Simon, 2007; Turing, 2009; Zadeh, 1996):

**Table 1. Developments in AI Technology**

Year	Development
1950	Alan Turing research and the Dartmouth conference
1960-1970	Called "Classic AI" which is characterized by the development of expert systems and simple natural language processing
1980	Rule-based system and fuzzy logic
1990	Machine learning dan neural networks
2000	Deep learning, big data, and computing improvements.
2010	computer vision, speech recognition, dan natural language processing.
2020	Large Language Machine (LLM), generative AI, and improved AI reasoning capabilities.



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Before generative AI was used in general as it is today, the use of AI in the field of education has been widely carried out in the field of education in Indonesia, such as in the calculation of minimum service standards for education using the Fuzzy Logic method (Agunawan & Paula, 2023). And now, other AI developments are as follows (McKinsey, 2018; Ramesh et al., 2022):

1. AI models that can process different types of inputs (text, images, sounds and videos),
2. Improved reasoning and more complex problem-solving skills,
3. Integration of AI into various industries and everyday applications,
4. Research on AI (explainable AI) and the ethics of using AI.

The use of AI technology is increasingly massive in business lines, such as in the creative industry which is currently being driven by the Government of Indonesia. Things that AI can do in this creative economy industry include:

1. Generative AI generates text, images, music, and videos, allowing creators to generate content quickly and creatively and at a scale.
2. Assist artists and designers by providing advice, generating ideas, or assisting in the editing process and creating designs/models.
3. It enables content personalization at scale and improves user experience in the entertainment and advertising industries.
4. Automating routine tasks in creative production, allowing creators to focus on more innovative aspects.
5. Generative AI enables the exploration of new art forms that combine human creativity with AI capabilities.

Higher education is an educational institution that has a role in producing quality and innovative Human Resources (HR). College graduates are expected not

only to become a reliable workforce, but also to create jobs for themselves and others. For this purpose, universities need to adapt and utilize AI technology that is increasingly developing, because it is possible that the role of humans as a workforce will be replaced by AI in certain parts, especially in routine activities.

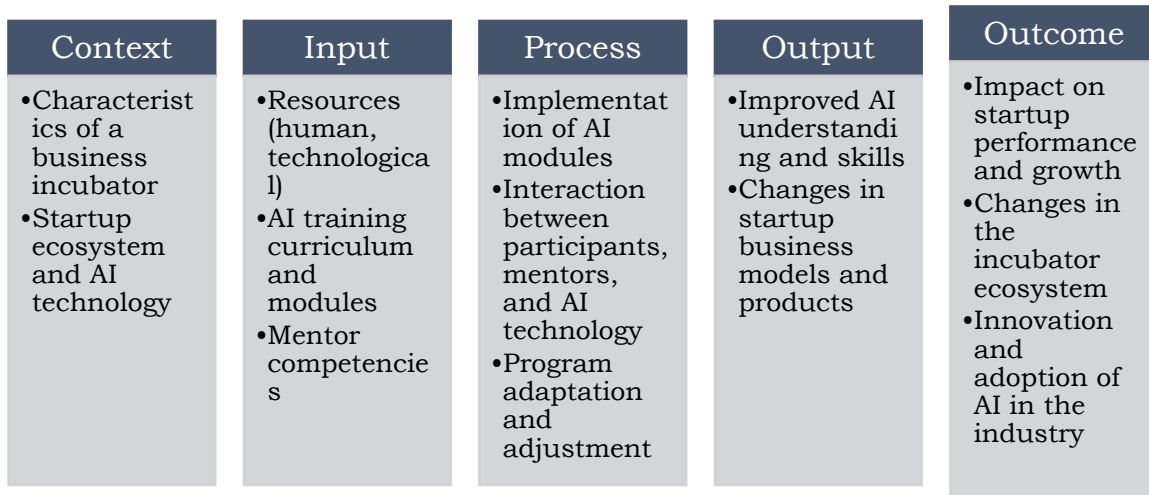
One of the ways to adapt is through integrating AI into the university's *tridharma* activities, namely teaching, research, and community service, including business incubators as supporting activities for students outside the lecture mechanism.

Business incubators in universities have long been an important means of encouraging entrepreneurial spirit among students and alumni. However, with the rapid development of technology and changing market dynamics, business incubators need to continue to innovate to remain relevant and effective (Agunawan et al., 2020).

Integrating AI as a training module in a business incubator can be a promising solution to improve the quality and effectiveness of incubation programs. This will produce university graduates as entrepreneurs who are better prepared to compete in the era of digital disruption (Asbara et al., 2024).

Based on this, this study will be studied with a focus on the following aspects:

1. Identify AI integration needs and opportunities in business incubator training modules.
2. Evaluate the effectiveness of AI-based training modules compared to conventional training methods.
3. Analyze challenges and solutions in the implementation of AI training modules in business incubators.
4. Developing a framework for AI integration that is appropriate to the local context and specific needs of business incubators in Indonesia.



**Figure 1. Conceptual Framework**

**B. Materials and Method**

The research methodology used is qualitative descriptive. Data collection methods through semi-structured in-depth interviews, participant observations, focused group discussions, and document analysis (Riadi et al., 2021). Case study and phenomenological research on the Business Incubator of the Nobel Institute of Technology and Business Indonesia to deeply understand the implementation process of the AI module, explore the experiences and perceptions of stakeholders (students, mentors and incubator managers), and identify factors that affect the success or obstacles to implementation. The data source is a population of 60 stakeholders (students, mentors and incubator managers). The collected data is then analyzed descriptively.

**C. Result and Discussion**

The results of this research are as follows:

**AI Module Adoption and Integration Process**

- a. Implementation stages:
  - 1) Preparation stage: Incubators conduct needs assessments and design AI curriculum.

- 2) Pilot stage: AI module tested on a small group of startups using the User Experience Questionnaire (UEQ) (Umar et al., 2020)
- 3) Adjustment stage: Feedback from the pilot phase is used to refine the module.
- 4) Full implementation stage: AI modules are integrated into the incubator program as a whole.
- b. Integration challenges:
  - 1) AI knowledge gap among participants.
  - 2) Limitations of technological infrastructure in incubators.
  - 3) Resistance from some mentors who are accustomed to traditional methods.
- c. Supporting factors:
  - 1) Strong support from incubator management.
  - 2) Collaboration with AI technology companies for materials and resources.
  - 3) High enthusiasm from the majority of startup participants.

**Stakeholder Experience and Perception**

- a. Participants startup:
  - 1) The majority reported significant improvements in AI understanding.

- 2) Some feel overwhelmed by the steep learning curve.
- 3) High appreciation of the practical and applicative aspects of the AI module.
- b. Mentor:
  - 1) Initially skeptical, but mostly became supporters after seeing the positive impact.
  - 2) Experience your own learning curve in integrating AI into mentoring.
  - 3) Appreciate the increased ability to provide advice that is more relevant to industry trends.
- c. Incubator manager:
  - 1) Seeing the increased appeal of incubator programs.
  - 2) Facing challenges in balancing AI focus with other aspects of the business.
  - 3) Observing increased collaboration with local tech ecosystems.

**Impact on the Learning Process and Startup Development**

- a. Changes in business models:
  - 1) 60% of startups report pivoting or significant adjustments to their business models to leverage AI.
  - 2) Increased focus on data-driven solutions and automation.
- b. Accelerate product development:
  - 1) Average time from idea to prototype reduced by 30% with the help of AI tools.
  - 2) Improved ability to iterate quickly based on AI data analysis.
- c. Upskilling:
  - 1) Participants reported increased confidence in technical discussions about AI.
  - 2) Increased ability to identify and evaluate AI solutions relevant to their business.

**Challenges and Opportunities**

- a. Challenge:

- 1) Ethical concerns about data use and privacy.
- 2) Difficulties in keeping up with the rapid development of AI technology.
- 3) Over-reliance on AI solutions, sometimes ignoring fundamental business aspects.
- b. Chance:
  - 1) Potential to create innovative solutions that address complex problems.
  - 2) Increased startup competitiveness in the global market.
  - 3) New collaboration possibilities between startups and big tech companies.

**Thematic Findings**

- a. AI as an Enabler, not a Solution:
 

The most successful participants see AI as a tool to improve their solution, not as a solution itself.
- b. Contextual learning:
 

The effectiveness of AI modules increases when directly integrated with real business challenges facing startups.
- c. Learning community:
 

Formation of an informal community among incubation participants to share AI knowledge and experience.
- d. The evolution of the mentor role:
 

The shift from mentors as "experts" to "learning facilitators" in the context of AI.

**Implications for Incubator Program Design**

- a. Adaptive curriculum:
 

The need for an AI curriculum that can be tailored to each startup's level of knowledge and specific needs.
- b. AI Ethics Integration:
 

The importance of including a module on AI ethics and the social implications of technology.
- c. Ecosystem collaboration:
 

Benefits of involving a wide range of stakeholders (technology companies, academics, industry practitioners) in the program.

d. Holistic approach:

The need to balance the focus on AI with other important aspects of business development.

## D. Conclusion

### Dynamics of AI Adoption and Integration in Business Incubators

The results show that the process of adoption and integration of AI modules in business incubator programs is a complex and gradual process. The identified implementation stages (preparation, pilot, adaptation, and full implementation) are in line with the innovation adoption model put forward by the (Liliani & Sidharta, 2018). These findings underscore the importance of a systematic and iterative approach to integrating new technologies into entrepreneurship education programs.

The integration challenges found, particularly the knowledge gap and resistance of some mentors, reflect the so-called (Vijaya & Irwansyah, 2024) as a "disruptive innovation" in education. This shows that AI adoption is not only a matter of technology, but also a change in culture and mindset in the incubator ecosystem.

Supporting factors such as management support and collaboration with AI technology companies emphasize the importance of an ecosystem approach in technology adoption, as argued by (Wibowo, 2024) in the entrepreneurial ecosystem development model.

### Stakeholder Perception and Experience

Variations in stakeholder experiences and perceptions reflect the complexity of AI implementation in the context of entrepreneurship education. The enthusiasm of startup participants, despite the challenges of a steep learning curve, shows the potential of AI as a tool to improve entrepreneurial capabilities, in line with the concept of "digital entrepreneurship"

discussed by (Oluwaseun Peter Oyeyemi et al., 2024).

The evolution of mentor attitudes from skeptical to supportive illustrates the process of "technological sensemaking" described by (Scarborough et al., n.d.). It emphasizes the importance of continuous learning and adaptation in the role of mentoring in the digital age.

The perception of incubator managers about increasing the attractiveness of the program and the challenges in balancing AI focus with other business aspects shows the dilemma often faced in the integration of new technologies into the educational curriculum, as discussed by (M. Ardiansyah et al., 2019) in the context of entrepreneurship education.

### Impact on the Learning Process and Startup Development

The significant changes in business models and product development acceleration reported by participating startups demonstrate the transformative potential of AI in entrepreneurship. This is in line with the concept of "digital transformation" discussed by (Fachrurazi et al., 2023), where digital technology not only improves efficiency but also enables new business models.

The improvement in participants' skills and confidence in terms of AI reflects the development of what is called (Kraus et al., 2018) as a "digital entrepreneurial mindset". This shows that the AI module not only transfers technical knowledge, but also develops the mindset necessary to innovate in the digital economy.

### Challenges and Opportunities

Emerging ethical and privacy concerns underscore the importance of integrating AI ethics into entrepreneurship curricula, aligned with the call for "responsible innovation" put forward by (Abualooush et al., 2016). This suggests that AI entrepreneurship education needs to go

beyond technical aspects and include social and ethical considerations.

The opportunity to create innovative solutions and improve global competitiveness reflects the potential of AI as a "general purpose technology" as argued by (Dubickis & Gaile-Sarkane, 2015). This confirms the strategic role of AI in shaping the entrepreneurial landscape of the future.

### Implications of Thematic Findings

The theme "AI as an Enabler, Not a Solution" demonstrates the importance of a balanced approach to the use of AI, in line with the argument (Di Vaio et al., 2020) about effective AI implementation in business.

"Contextual Learning" and the establishment of informal "Learning Communities" emphasize the importance of experiential and social learning approaches in entrepreneurship education, as advocated by (Chiu, 2019).

"The Evolution of the Role of Mentors" reflects a paradigm shift in entrepreneurship education in the digital era, demanding a redefinition of the role of educators as discussed by (R. Ardiansyah et al., 2020).

### Implications for Incubator Program Design

The need for adaptive curricula and ethical integration of AI reflects the complexity and dynamism of today's technology landscape. This is in line with the call for a more flexible and responsive approach to entrepreneurship education, as advocated by (Lutfiani et al., 2020).

The importance of ecosystem collaboration and a holistic approach reaffirms the argument (Sulikah et al., 2021) about the importance of building a strong and integrated entrepreneurial ecosystem.

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