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RESEARCH ARTICLE

Anti-dependency teaching strategy for innovation in the age of AI among technology-based students

Kier P. Dela Calzada*

Zamboanga Peninsula Polytechnic State University-Vitali Campus, Zamboanga City 7000, Philippines
*** Corresponding author:** kier P. Dela Calzada, Kier.dcalzada@gmail.com

ABSTRACT

The anti-dependency teaching strategy aims to prepare technology-based students for the evolving world of artificial intelligence (AI). Instead of teaching students to be passive users of technology, it pushes them to become active producers and problem solvers. By cultivating creativity, critical thinking abilities, and a growth mentality, this approach equips students to use AI as a tool for innovation. It explores the potential of AI while acknowledging its limitations and ethical implications through project-based learning, interdisciplinary methodologies, and real-world applications. In order to promote an innovative culture and group problem-solving, it also integrates collaborative learning environments. The approach places a strong emphasis on adaptation and ongoing learning, keeping students abreast of developments in artificial intelligence and related fields. The study's respondents were twenty-four (24) instructors of technology-based disciplines with creative elements. By putting this plan into practice, educators can give students the knowledge and perspective they need to effectively navigate the AI era, producing a new generation of creative thinkers who can transform society for the better.

Keywords: teaching strategy; Artificial Intelligence; technology-based students; interdisciplinary approaches; ethical considerations; adaptability

1. Introduction

Artificial Intelligence (AI) has created opportunities and substantial changes in the ever-changing technology landscape. The promise of AI in algorithm design, data management, and marketing is highlighted by Haleem[1]. He does caution against over-reliance on AI, though, since it might impede creativity, creative problem-solving, and critical thinking in technology-related sectors. An anti-ependency education approach has been created in response to this, enabling students to be creative in the AI era and guaranteeing their ability to adjust to the quickly changing technological environment.

Smith[2] emphasizes the value of critical thinking abilities in training tactics aimed at preventing dependency. Students are urged to challenge, dissect, and assess data produced by AI, pointing out its flaws, restrictions, and moral dilemmas. With this method, kids are better able to make thoughtful choices and create original solutions that go beyond what I can do. The anti-dependency teaching approach places a strong emphasis on using project-based learning and practical exercises to encourage creativity and innovation.

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According to Brown and Miller[3], these approaches are important because they motivate students to investigate AI technology, conduct experiments, and work through problems. This leads to creative solutions and cutting-edge applications in a variety of fields.

The anti-dependency education approach integrates knowledge from other domains to promote creativity and critical thinking. The advantages of this method are emphasized by Chen et al.[4], who state that it fosters cross-pollination of ideas and allows students to explore beyond their field of expertise, resulting in creative solutions that make use of AI technologies.

An important component of the anti-dependency teaching approach is ethical issues. In order for students to comprehend the responsible use and societal impact of AI technologies and applications, Davis and Johnson[5] underline the importance of ethical discourse and decision-making frameworks in AI education. They also emphasize the necessity for students to critically assess the ethical implications of AI technologies and applications. The collaborative learning environment is a crucial part of the anti-dependency teaching style. Wang and Li[6] highlight the importance of collaborative learning environments in anti-dependency education strategies, highlighting the benefits of teamwork, information exchange, and group projects that enhance communication and problem-solving abilities. Students are urged to stay current on advancements in relevant subjects such as artificial intelligence[7]. They develop a mindset of lifelong learning that enables them to remain creative throughout their careers and adapt to the rapidly evolving AI landscape[8].

Lastly, the anti-dependency education approach encourages students to keep up with developments in artificial intelligence by emphasizing constant learning and flexibility. According to Lee and Johnson[7], this kind of thinking enables students to innovate throughout their careers and adjust to the quickly changing AI world.

In conclusion, a comprehensive method for empowering tech-savvy pupils in the AI era is provided by the anti-dependency education approach. Students are given the knowledge and perspective needed to confidently navigate the AI-driven future by developing critical thinking abilities, encouraging creativity and innovation, supporting interdisciplinary approaches, addressing ethical issues, creating collaborative learning environments, and placing an emphasis on lifelong learning.

1.1. Research objective

This research objective helps to explore the Anti-Dependency Teaching Strategy For Innovation in the Age of AI Among Technology-Based Students.

1. Determine characteristics of AI-dependency of Technology-based learners in producing innovative-based academic output

2. Determine teaching strategies in reducing AI-dependency of Technology-based69 learners in producing innovative-based academic output

1.2. Literature

AI's rapid advancements are causing concerns about students' overreliance on technology, which could hinder critical thinking, creativity, and innovation. To address this, an anti- dependency teaching approach has been developed to empower students and foster creativity in the era of AI, ensuring they are well-prepared to navigate the complexities of this rapidly evolving landscape.

1.2.1. Gaining knowledge in critical thinking

The development of critical thinking abilities is a crucial component of the anti- dependency education approach. Students are urged to challenge, dissect, and assess data as well as outcomes produced by AI[2].

Students can recognize biases, constraints, and potential ethical issues related to AI systems by applying critical thinking skills. As a result, they are better equipped to make judgments and create creative solutions that surpass AI's limitations[9].

1.2.2. Promoting innovation and creativity

The anti-dependency education approach places a strong emphasis on encouraging pupils who use technology to be creative and innovative. Students are encouraged to investigate AI technologies as tools for creativity through project-based learning and practical exercises[3]. Students can create original solutions and use AI in cutting-edge ways across a variety of fields by being given the chance to experiment and solve problems[10].

1.2.3. Promoting multidisciplinary methods

Multidisciplinary approaches are used in the anti-dependency teaching strategy to promote innovation. Students get a deeper grasp of AI and its possible uses by combining information from other domains[11]. This interdisciplinary approach promotes idea cross-pollination and allows students to look beyond the box of their specialization, resulting in creative solutions that make use of AI technologies[4]. An important component of the anti-dependency teaching approach is ethical issues. According to Robinson and Martin[12], students are urged to critically consider the moral ramifications of AI technology and their uses. Students gain a thorough grasp of the appropriate use of AI and its effects on society by combining ethical discussions with decision-making frameworks[5].

1.2.4. Developing environments for collaborative learning

An essential component of the anti-dependency teaching approach is the collaborative learning environment. According to Wang and Li[6], students are encouraged to work together with their peers, participate in group projects, and exchange ideas and expertise. This promotes communication, cooperation, and group problem-solving abilities. Students' capacity to innovate and provide significant solutions is increased when they work together and learn to capitalize on each other's talents[13]. In conclusion, the anti-dependency teaching strategy provides a thorough method for enabling students who are accustomed to using technology in the AI era. Students are given the knowledge and perspective needed to confidently navigate the AI-driven future by developing critical thinking abilities, encouraging creativity and innovation, supporting interdisciplinary approaches, addressing ethical issues, creating collaborative learning environments, and placing an emphasis on lifelong learning. With the use of AI technology, this approach equips students to become engaged creators, problem solvers, and innovators who can influence positive social change.

The Anti-Dependency Teaching Strategy has been shown in numerous studies to be successful in encouraging creativity in students who use technology. For instance, compared to students in standard educational contexts, students exposed to this teaching style showed higher levels of creativity and problem-solving abilities[14]. In a similar vein, Brown et al.[15] found that students participating in project-based learning exercises as a component of the Anti-Dependency Teaching Strategy showed a rise in motivation and self-assurance regarding their capacity to handle challenging technological problems.

Additionally, studies have demonstrated the potential benefits of the Anti-Dependency Teaching Strategy for increased creativity and innovation. Students who were enrolled in a curriculum that included the Anti-Dependency Teaching Strategy showed a stronger inclination toward innovation and a greater desire to try out new technologies, according to a study by Lee and Kim[16]. This implies that the Anti-Dependency Teaching Strategy fosters an environment that is favorable for creativity and originality by pushing pupils to think for themselves, take calculated chances, and investigate novel concepts.

1.2.5. Implications and future directions

The significance of applying the Anti-Dependency Teaching Strategy in learning environments to encourage creativity among students who use technology in the AI era. In order to investigate the long-term impacts of this teaching strategy on students' capacity to adjust to technological breakthroughs and affect significant change through innovation, more study is required in the future. Further research endeavors may explore the possible effects of incorporating artificial intelligence (AI) technology into the Anti-Dependency Teaching Strategy, with the aim of augmenting individualized learning encounters and promoting student involvement.

Studies on the Anti-Dependency Teaching Strategy have demonstrated encouraging outcomes in terms of encouraging creativity in students who use technology. For example, compared to students in standard educational contexts, students exposed to the Anti-Dependency Teaching Strategy showed higher levels of creativity, critical thinking, and problem-solving ability[17]. The beneficial effects of student-centered learning strategies on students' motivation and participation in class activities were also underlined by the study.

Similarly, in AI education, a study by Wang et al.[18] investigated the impact of the Anti-Dependency Teaching Strategy on students' capacity for innovation. The results showed that students who engaged in cooperative problem-solving exercises and project-based learning activities as part of the Anti-Dependency Teaching Strategy showed more confidence in their capacity to use AI technology in innovative and morally responsible ways. The study underlined how crucial it is to provide a welcoming and engaging learning environment to develop students' capacity for innovation.

In summary, the Anti-Dependency Teaching Strategy has great potential to develop creativity and innovation in students who use technology in the AI era. This teaching approach gives students the tools they need to navigate the complexities of the digital world and drive meaningful change through innovation. The anti-dependency teaching strategy is essential for fostering innovation among technology-based students in the age of artificial intelligence. It does this by empowering students to become self-directed learners and encouraging critical thinking and problem-solving skills. Teachers can help children become ready for success in the rapidly changing digital world by giving them the tools they need to think critically and creatively. With an emphasis on freedom, creativity, and critical thinking, this method of instruction gives students the tools and perspective they need to succeed in a quickly changing technology environment. The Anti-Dependency Teaching Strategy is particularly useful for enabling students to drive innovation and contribute significantly to society through AI-driven solutions, as educators continue to modify their pedagogical approaches to meet the demands of the digital age. With technology developing at a breakneck speed, the Anti-Dependency Teaching Strategy is a useful framework for equipping students to succeed in a constantly changing technological environment.

2. Methods

The primary data gathered for this study is used as supporting evidence for additional theoretical and developmental assessments that take research into consideration. This qualitative approach will be used to gather information on the Anti-Dependency Teaching Strategy For Innovation in the Age of AI Among Technology-Based Students through observations and interviews. Research can learn more about teaching strategies in reducing AID-dependency of Technology-based learners in producing innovative-based academic output.

2.1. Participants

The study adopted purposive sampling, and twenty-four (24) participants of Instructors of technology-

based subjects with innovative components were the respondents of this study. Respondents answer the questions covered in instrument during the conversation. These individuals were chosen so that participants in personalized interviews may examine the data from different perspectives.

2.2. Instrument

In order to collect the narratives for the Anti-Dependency Teaching Strategy For Innovation in the Age of AI Among Technology-Based Students, the study participants were interviewed. Experts have certified this device to collect data in a suitable and effective manner. The interview guide questions are as follows.

Table 1. Instrument of the Study.

Objectives	Interview questions	N
1. Determine characteristics of AI-dependency of Technology- based learners in producing innovative-based academic output.	1. What are the characteristics of students who are dependent on Artificial Intelligence (AI) like ChatGPT to help them with innovative-based academic requirements?	24
2. Determine teaching strategies used by instructors in reducing AI-dependency of Technology- based learners in producing innovative-based academic output	2. What are the effects of dependency to AI in terms of their innovative skills? 3. What are the issues of dependency to AI in terms of academic integrity? 4. Do you allow your students to use AI to aid them in producing innovative-based outputs? Explain why or why not. 5. How do you manage the use (or not use) of AI in terms of the output with components of innovativeness? Elaborate by citing specific situations. 6. What strategies do you employ to reduce the AI-dependency of Technology-based learners in producing innovative-based academic output. Enumerate and explain each strategy. 7. How do you employ these strategies to reduce the AI-dependency of Technology- based learners in producing innovative-based academic output? Explain the steps or procedure in doing the strategies. 8. What are the effects of these strategies to the innovative skills and output of the students?	

2.3. Research procedure

The aim of the data gathering method is to identify the traits of technology-dependent learners' reliance on AI to produce creative academic output. The interviews will look at the traits of technology-dependent learners' AI-dependency in generating creative academic content. The twenty-four (24) instructors of technology-based subjects with innovative components who participated in the study were the chosen participants. In order to enable a full understanding of the teaching tactics utilized by instructors in lowering the AI-dependency of Technology-based learners in producing innovative-based academic output, the study will employ thematic analysis to identify recurrent themes and patterns in the data.

2.4. Data analysis

The primary source of data for this study was the narratives gathered through interviews with the instructor selected to take part in the Anti-Dependency Teaching Strategy For Innovation in the Age of AI Among Technology-Based Students. The transcribed interview data will be classified and categorized to discover key themes relating to the Anti-Dependency Teaching Strategy for Innovation in the Age of AI Among Technology-Based Students. Several of the chat stories were subjected to a theme analysis. Themes in a dataset are identified, assessed, and examined prior to compilation, categorization, and display[19]. Our objective is to gain a comprehensive understanding of the essential components influencing the teaching tactics employed by educators to lessen the reliance of technology-based learners on artificial intelligence (AI) to produce new academic output, through data analysis.

3. Results

3.1. Question 1

Question 1. *What are the characteristics of students who are dependent on Artificial Intelligence (AI) like ChatGPT to help them with innovative-based academic requirements?*

3.1.1. Intensive use

Twenty-four (24) respondents said that the investigation explored the interplay between students' extensive use of AI tools, particularly ChatGPT, for academic tasks and their cognitive and behavioral tendencies. The findings underscore a nuanced relationship where students heavily reliant on AI exhibit a strong grasp of technology and innovative study methods, prioritizing efficiency and embracing technological advancements. However, a concern arises regarding the potential drawbacks of overdependence, as these students may experience diminished critical thinking and creativity, relying excessively on AI-generated solutions. This overreliance, facilitated by the convenience of AI, risks bypassing traditional research methods and neglecting the evaluation of information credibility. Thus, while AI tools enhance productivity, fostering a balanced approach that encourages technological integration alongside the cultivation of independent cognitive skills emerges as crucial for holistic academic development.

"Students who use AI tools like ChatGPT a lot for their school work are usually good with technology andcreative174 in how they study. They like working smart and use AI to help them save time."

"Lazy because the student will become dependent to Ai tools and they will not use their skills and abilities to do the requirements."

"Students tend to over rely on AI due to several reasons. One reason is the ease and convenience that AI technologies provide in accessing information and completing tasks."

3.2. Question 2

Question 2. *What are the effects of dependency to AI in terms of their innovative skills?*

3.2.1. Reliance on AI

Sixteen (16) respondents agreed that when students excessively depend on AI, such reliance can yield both positive and negative implications for their innovative skills. On one hand, AI facilitates innovation by tailoring learning experiences, furnishing information, and automating tasks. Yet, an overreliance on AI poses risks to critical thinking, creativity, and profound comprehension of intricate concepts, potentially fostering ethical quandaries like plagiarism. The burgeoning dependence on AI threatens to erode critical thinking proficiencies as individuals increasingly defer to AI systems for decision-making, problem-solving, and data

aggregation, potentially yielding shallow understandings of complex phenomena.

"When students rely too much on AI, it can have both good and bad effects on their innovative skills. AI can help them be more innovative by personalizing learning, providing196 information, and automating tasks."

"If students depend too much on AI, they might not develop their own innovative skills. AI gives quick answers, but it doesn't encourage out-of-the-box thinking."

3.2.2. Hinder to think creative

Eight (8) respondents underscore the potential negative impact of excessive reliance on AI on students' cognitive development and problem-solving abilities. Relying heavily on AI tools may hinder students' capacity to think creatively and independently. This overreliance can restrict their ability to innovate autonomously and hamper the cultivation of critical thinking skills. By outsourcing problem-solving tasks to AI, students may miss out on valuable opportunities for intellectual growth and innovation.

"Relying too heavily on AI can suppress students' ability to think creatively and solve problems on their own. This can restrict their ability to innovate independently and impede the development of critical thinking skills."

3.3. Question 3

Question 3. *What are the issues of dependency to AI in terms of academic integrity?*

3.3.1. Dependency

Twelve (12) respondents stated that relying heavily on AI poses a risk to academic integrity, increasing the likelihood of plagiarism and diminishing originality in student work due to improper attribution of AI-generated content. Students may be tempted to present AI-generated material as their own, compromising honesty. While technology itself doesn't impede learning, misattributed AI content can distort research findings and obscure understanding, undermining the educational process. Therefore, it's crucial to use AI responsibly, ensuring proper attribution and upholding academic standards to maintain integrity in academic work.

"Depending too much on AI can jeopardize academic integrity by increasing the risk of plagiarism and diminishing the originality of students' work."

"It's crucial to maintain a balance, ensuring students understand ethics, maintain academic integrity, and develop their critical thinking and creative skills alongside AI usage."

3.3.2. Innovation

Five (5) respondents underscore the dual nature of AI's impact on innovation in academics. On one hand, AI tools can facilitate innovative approaches to academic work by providing information and assisting in research processes. However, there is a significant risk of inaccuracies and misleading information generated by AI, which can undermine students' comprehension of subjects and the educational process as a whole. Ultimately, the use of AI tools for innovative-based outputs requires careful consideration and responsibility from students to ensure academic integrity and originality are maintained.

"This goes against the principles of honesty and originality that are crucial in academia."

" Information generated by AI can be inaccurate or misleading, meaning it will fabricate research, fake a source, not attribute authors for their work, and obscure students' comprehension of subject matter."

3.3.3. Integrity

Seven (7) participants agree that the ethical challenges students face when using AI tools, particularly in

terms of academic integrity. The ease of access to AI-generated content may lead to issues such as plagiarism and lack of originality. Students may be tempted to pass off AI-generated work as their own, which undermines the principles of honesty and academic integrity. This highlights the importance of promoting ethical practices and proper citation standards to ensure that students uphold integrity in their academic endeavors.

"Students using AI might face issues like plagiarism and lack of originality. They could be tempted to use AI-generated content as their own, which isn't honest."

"Depending too much on AI can jeopardize academic integrity by increasing the risk of plagiarism and diminishing the originality of students' work."

3.4. Question 4

Question 4. *Do you allow your students to use AI to aid them in producing innovative-based* 255 *outputs? Explain why or why not.*

3.4.1. Diminished the originality

Twenty-Four (24) respondents highlighted an increased dependence on AI substantially elevated the risk of plagiarism and diminished the originality of students' work. Specifically, the respondents expressed concerns over the potential failure to properly acknowledge or attribute content generated by AI tools, highlighting the ethical dilemma it presents. Additionally, respondents admitted to facing issues related to plagiarism and lack of originality, acknowledging the temptation to present AI-generated content as their own, which they recognized as dishonest. Moreover, respondents emphasized the importance of usingAI responsibly, stressing the critical need to maintain academic integrity despite technological assistance.

"No, because Information generated by AI can be inaccurate or misleading, meaning it will fabricate research, fake a source, not attribute authors for their work, and obscure students' comprehension of subject matter."

"As an IT instructor I believe AI can be a helpful tool for students if used correctly. It shouldn't replace their own thinking and creativity."

"If it's only for studying I would allow my students to use AI but if it's for assignments or innovative outputs I would not allow it because they won't use critical thinking or they would just depend mostly on AI."

3.5. Question 5

Question 5. *How do you manage the use (or not use) of AI in terms of the output with components of innovativeness? Elaborate by citing specific situations.*

3.5.1. Preserving originality

Twenty-Four (24) respondents emphasized the crucial importance of nurturing creativity and preserving originality alongside the integration of AI in education. They advocate for a balanced approach, recommending strategies such as designing creative assignments to engage students in idea generation and solution exploration, planning AI integration thoughtfully to align with educational goals and address ethical concerns, and promoting independent problem-solving skills before introducing AI as a supplementary tool.

"Foster Creativity and Originality. Encourage learners to participate in creative assignments that allow them to generate their own ideas and solutions. Promote brainstorming, idea generation, and experimentation."

"To manage AI use, students should be encouraged to use AI for research and ideas, but not as the only source of their work."

"Manage the use of AI by encouraging students to initially approach tasks without immediate AI support."

3.6. Question 6

Question 6. *What strategies do you employ to reduce the AI-dependency of Technology-based learners in producing innovative-based academic output. Enumerate and explain each strategy. 3.6.1 Incorporating Visual or Interactive*

Seventeen (17) individuals expressed that to cultivate independent thinking and diminish reliance on AI, educators can implement various strategies. Encouraging collaborative group projects promotes teamwork and cooperation, fostering an environment conducive to constructive feedback and critical thinking. Facilitating discussions that challenge assumptions and incorporate diverse perspectives further enhances innovation among learners. Additionally, incorporating visual or interactive elements into assessments deters cheating by preventing the direct copying of content into AI tools.

"Incorporate questions with visual or interactive elements- Rather than assigning a multiple-choice question, utilize questions that have a visual or interactive component. Incorporating visual elements, such as images, graphs, videos or diagrams, into assessments can deter cheating students can't copy these elements into AI tools."

"Encourage learners to collaborate with their peers through group projects that foster teamwork and cooperation. Create a supportive environment where learners can provide constructive feedback to each other, promoting critical thinking and innovation."

3.6.1. Promoting independent research

Seven (7) respondents highlighted that to mitigate dependency on AI, educators can implement strategies such as promoting independent research, hands-on projects, and group discussions. These activities foster critical thinking and creativity among students. Encouraging self-learning through assignments that necessitate independent research and problem-solving without sole reliance on AI further cultivates independent thinking skills.

"To reduce AI-dependency, strategies could include promoting independent research, hands-on projects, and group discussions. These activities encourage critical thinking and creativity."

3.7. Question 7

Question 7. *How do you employ these strategies to reduce the AI dependency of Technology Based learners in producing innovative-based academic output? Explain the steps or procedure in doing the strategies.*

3.7.1. Fostering critical thinking

Twenty-Four (24) participants stated that implementing these strategies yields positive outcomes for students' innovative skills and outputs. By fostering critical thinking, students enhance their ability to analyze and evaluate information, leading to the generation of unique ideas. Assigning projects in subjects like Statistics, Physics, and Chemistry provides practical, real-world applications that challenge students to apply their knowledge, making it difficult for AI to provide answers.

"For self-learning, give assignments that require students to use various resources, not just AI."

"To use these strategies, teachers could set rules about AI use, include more interactive learning activities, and give feedback emphasizing the importance of originality and creativity."

"Implementing these strategies can have positive effects on the innovative skills and output of students."

3.8. Question 8

Question 8. *What are the effects of these strategies to the innovative skills and output of the students?*

3.8.1. Responsible usage

Five (5) respondents state the importance of establishing clear guidelines and policies regarding the use of AI tools in academic settings. While encouraging students to explore and experiment with AI for enhancing their innovative outputs, it is essential to provide guidance on responsible usage. Policies should emphasize the importance of using AI-generated content as a starting point for creative ideas, while also stressing the need for critical evaluation and refinement to maintain originality. Ethical considerations, such as proper attribution and plagiarism avoidance, should be integrated into these policies to ensure academic integrity. Ultimately, as an IT instructor, the belief is that AI can serve as a valuable tool for students if used appropriately, but it should never replace their own thinking and creativity.

"They can use AI-generated content as a starting point for their own creative ideas, leveraging AI's unique perspectives."

"As an IT instructor I believe AI can be a helpful tool for students if used correctly. It shouldn't replace their own361 thinking and creativity."

3.8.2. Implementing stringent policies

Four (4) respondents state that regarding the importance of implementing cautious policies regarding the use of AI in academic settings. Concerns over the accuracy and reliability of AI-generated information necessitate the establishment of policies to mitigate potential risks. Policies should address the potential for AI to produce inaccurate or misleading content, including fabricated research and unattributed sources, which can undermine the educational process and hinder students' comprehension of subject matter.

"No, because Information generated by AI can be inaccurate or misleading, meaning it will fabricate research, fake a source, not attribute authors for their work, and obscure students' comprehension of subject matter. "

3.8.3. Management

Six (6) respondents suggest the importance of effective management strategies to foster creativity and originality while utilizing artificial intelligence in educational and workplace settings. Encouraging learners and employees to participate in creative assignments and activities promotes idea generation and experimentation, fostering a culture of innovation. By emphasizing the development of their own creative ideas and solutions, individuals can produce outputs that are distinct from AI-generated content. Strategic planning is essential for the successful integration of AI in the workplace, involving the clear definition of AI's role and alignment with organizational objectives.

"These strategies are implemented through the integration of curriculum, the design of assignments, and classroom discussions."

"To use these strategies, teachers could set rules about AI use, include more interactive learning activities, and give feedback emphasizing the importance of originality and creativity."

3.8.4. Reduction

Nine (9) respondents indicate that implementing strategies aimed at reducing AI dependency can yield positive outcomes for students' innovative skills and output. By fostering critical thinking, students enhance their ability to analyze and evaluate information, leading to the generation of unique and original ideas.

Assigning projects in courses such as Statistics, Physics, and Chemistry serves as an effective assessment tool, challenging students to apply their knowledge in real-world contexts. These hands-on assignments not only test students' understanding but also make it difficult for AI to provide answers, encouraging independent thinking and creativity. Overall, the implementation of reduction strategies empowers students to develop essential skills and produce innovative outputs that are not solely reliant onAI technology.

"For self-learning, give assignments that require students to use various resources, not just AI." "Open-ended questions, in particular, force students to demonstrate their true understanding, as they cannot rely on AI-generated responses."

4. Discussion

4.1. Question 1

Question 1. *What are the characteristics of students who are dependent on Artificial Intelligence (AI) like ChatGPT to help them with innovative-based academic requirements?*

4.1.1. Intensive use

The results highlight a complicated relationship in which students who significantly rely on AI demonstrate a solid understanding of technology and creative study techniques, placing a high value on efficiency and embracing technological innovations. But there's cause for concern about the possible negative effects of over-reliance—these pupils may become less creative and critical thinkers because of depending too much on AI-generated answers. This theory is consistent with Paesano[20] examining if human labor in creative pursuits may be replaced by the extensive application of AI in organizational behavior. This over-reliance, made possible by AI's convenience, runs the risk of eschewing conventional research techniques and ignoring the assessment of the reliability of the information. This theory is consistent with Mukhamediev et al.[21]. Both the AI (internal problems) and the societal (external problems) perspectives must be taken into account when analyzing the difficulties associated with mainstream AI applications. Therefore, even though AI technologies increase productivity, it becomes imperative for holistic academic growth to promote a balanced strategy that promotes technological integration alongside the development of autonomous cognitive skills.

4.2. Question 2

Question 2. *What are the effects of dependency to AI in terms of their innovative skills?*

4.2.1. Reliance on AI

As people rely more and more on AI systems for data gathering, decision-making, and problem-solving, their critical thinking skills are at risk of being undermined, leading a superficial comprehension of intricate phenomena. This theory is consistent with Solberg[22]. The application of artificial intelligence (AI) to enhance organizational decision-making is gaining traction. But studies show that people's decision to rely on "AI decision aids" and their level of trust in them might be shaky. Furthermore, an over-reliance on AI may hinder students' ability to independently solve problems and generate creative ideas, which would limit their prospects for creativity and hinder the development of strong critical thinking skills. The approach is in line with the organizational trust model of Mayer[23] in order to develop a conceptual model of trust, perceived risk, and dependence on AI decision aids in the workplace. As a result, if people rely too much on AI, their capacity for creativity may suffer because of the technology's tendency to make decisions quickly, which could interfere with the development of creative thinking. This less dependence on one's own cognitive abilities runs the risk of impairing one's capacity for creativity and critical thought, which limits one's ability to adapt and think creatively when faced with unfamiliar situations.

4.2.2. Hinder to think creative

This over-reliance may limit their capacity for independent innovation and impede the development of critical thinking abilities. This theory is consistent with Duhaylungsod et al.[24]. Students may develop a different perspective as a result of the ease with which AI models may give them the knowledge and concepts they require, eliminating the need for them to think or conceptualize. If students entrust AI with problem-solving activities, they might be losing out on important chances for creativity and intellectual development. This theory supports the findings of Ayu[25] who found that ideas are difficult to incorporate into narrative-based writing. As a result, writing constrained narratives will become a skill. Therefore, even though I can be a useful tool, educators must push students to find a balance and develop their ability to solve problems through critical thinking and independent thought.

4.3. Question 3

Question 3. *What are the issues of dependency to AI in terms of academic integrity?*

4.3.1. Dependency

There is good reason to be concerned about how reliance on AI will affect academic integrity, especially in relation to plagiarism. This theory is in line with the findings of Awasthi[26], who also discovered that methods to limit academic misconduct, such as plagiarism, must be put in place in response to the issue of vigilance in the academic community. They Pointed out that students might rely too much on AI technologies, which would result in the submission of work that isn't authentic or unique, going against core academic values. Students' integrity can be compromised if they submit content produced by AI as their own. This concept is in line with the conclusions of Weber[27], which pushes businesses to give AI systems the right data basis and to continuously modify them as the data changes. Technology doesn't make learning harder, but misattributed AI content might skew knowledge and misrepresent study conclusions, which can undermine the educational process. Therefore, to preserve academic integrity, it is imperative that AI be used responsibly, with correct acknowledgment and adherence to academic standards.

4.3.2. Innovation

The result emphasized that students run the risk of unintentional plagiarism if they don't properly credit AI-generated sources. This theory is consistent with the findings of Zielinski[28] which states that academic content created or edited by AI would be saved and might therefore show up in subsequent responses, raising the possibility of unintentional plagiarism on the part of the user and any subsequent users of the technology. Although students ultimately decide how to use AI for creative outputs, AI tools can support creative approaches to academic work by offering data and supporting research procedures. However, there is a serious chance that AI will produce false information and mistakes, which could impair students' understanding of the material and the educational process in general. This theory is consistent with the findings of Zhang[29], which show that the user preference deviation phenomena affects the accuracy of the personal recommender system and also fails to accurately reflect users' genuine preferences. Academic integrity problems, especially with regard to plagiarism, can arise from a student's over-reliance on AI-generated information and their failure to properly attribute sources or acknowledge the originality of their own work. In the end, students must exercise caution and accountability while using AI tools to produce new outputs to preserve originality and academic integrity.

4.3.3. Integrity

The results emphasized the significance of finding a balance, developing an ethical awareness, maintaining academic integrity, and fostering critical thinking and creative abilities in addition to the use of

AI. This theory is supported by Delos Reyes et al.[30] showing that struggles with vocabulary, grammar structures, and pronunciation especially when it comes to speaking and understanding the language. Students can take use of AI's advantages while maintaining the integrity of their academic work by doing this. The accessibility of AI-generated content can result in problems like copying and a lack of originality. This theory is consistent with the research conducted by Mitchell[31], which found other records that suggest something more pervasive and possibly much more dangerous than a lack of originality. The idea of students passing off AI-generated work as their own is tempting, and it goes against the values of academic integrity and honesty. This emphasizes how crucial it is to support moral behavior and appropriate reference guidelines so that students maintain integrity in their academic pursuits.

4.4. Question 4

Question 4. *Do you allow your students to use AI to aid them in producing innovative-based outputs? Explain why or why not.*

4.4.1. Diminished the originality

Concerning the potential inability to appropriately credit or acknowledge information produced by AI tools, the respondents emphasized the moral conundrum that this technology poses. Furthermore, respondents acknowledged that they struggled with concerns of plagiarism and lack of originality. They also acknowledged that they were tempted to present work generated by AI as their own, even though they knew this was dishonest. This theory is consistent with Sallam[32] 58/60 (96.7%) records raised concerns about the use of ChatGPT, including risks related to bias, plagiarism, lack of originality, inaccurate content that could cause hallucinations, limited knowledge, incorrect citations, cybersecurity, and the possibility of infomedics. Additionally, Respondents also emphasized the inherent danger related to the dependability and accuracy of data produced by AI, warning against the possibility that it could skew study results and make it more difficult for students to understand the material. This concept corresponds with the results of Deniz[33]. Artificial intelligence obtains its data from the internet, where information authenticity and dependability are continuously contested. ChatGPT has the potential to generate biased and factually incorrect texts, which can particularly damage academics' authority and reputation. These results highlight the necessity of carefully balancing the use of AI to improve learning with maintaining academic integrity to provide a supportive learning environment.

4.5. Question 5

Question 5. *How do you manage the use (or not use) of AI in terms of the output with 518 components of innovativeness? Elaborate by citing specific situations.*

4.5.1. Preserving originality

The result encourages a well-rounded approach, suggesting tactics like encouraging autonomous problem-solving abilities before introducing AI as a supplemental tool, carefully planning AI integration to align with educational goals and address ethical concerns, and creating innovative assignments to engage students in idea generation and solution exploration. This theory is consistent with Chavez et al.[34]. Reputation, optimism, competence, and applicability were the main factors predicting motivation. They also stress how important it is for all parties involved to have a basic understanding of AI principles. This theory is consistent with Currie[35]. A foundational knowledge of radiomics, artificial neural networks, machine learning, and deep learning is necessary to weave design solutions that satisfy legal and ethical requirements and to create AI-based algorithms that improve efficiency, quality, and results. By putting these strategies into practice, teachers may make sure that students gain the ability to think critically and creatively while utilizing AI's advantages in the classroom, creating a more comprehensive and stimulating learning environment.

4.6. Question 6

Question 6. *What strategies do you employ to reduce the AI-dependency of Technology-based learners in producing innovative-based academic output. Enumerate and explain each strategy.*

4.6.1. Incorporating visual or interactive

Teachers can use a variety of tactics. Collaborative group projects encourage cooperation and teamwork while creating an atmosphere that is favorable to critical thinking and constructive criticism. This theory is consistent with Sabdani-Asiri[36]. Academic leaders can improve their confidence, communication skills, and general efficacy by utilizing these tools and techniques. Encouraging conversations that question presumptions and consider other viewpoints helps learners become even more innovative. Numerous scholars have examined this issue and attempted to categorize different forms of plagiarism; yet, the majority of these techniques are ineffective in identifying intelligent plagiarism. Effective strategies for encouraging autonomous thought include peer collaboration, organized brainstorming sessions, giving manual problem-solving priority, and talking about the moral ramifications of using artificial intelligence. These methods seek to foster critical thinking abilities in students and motivate them to think about the wider effects of AI integration.

4.6.2. Promoting independent research

Teachers might use techniques like encouraging individual study, practical projects, and group debates. This theory is consistent with research by Inoferio et al.[37], which found that using AI models fosters students' sense of independence and motivates them to actively participate in self-guided learning. Students' critical thinking and creativity are encouraged by these exercises. This theory supports the findings of Šašić[38] and has a significant impact on promoting the growth of efficient learning techniques for self-regulation. Individual thinking skills are further developed by assigning tasks that require individual inquiry and problem-solving without the use of AI.

4.7. Question 7

Question 7. *How do you employ these strategies to reduce the AI dependency of Technology Based learners in producing innovative-based academic output? Explain the steps or procedure in doing the strategies.*

4.7.1 Fostering critical thinking

Students that are encouraged to think critically are better able to assess and analyze data, which produces original ideas. It is challenging for students to apply their knowledge when they are assigned projects in disciplines like physics, chemistry, and statistics. This makes it tough for AI to deliver answers. This concept is consistent with the results of Ennis[39]. Projects that entail researching, adopting, and defending a stance strengthen critical thinking skills and attitudes while expanding subject-matter expertise. The curriculum, assignment designs, and class discussions all incorporate these tactics, which establish clear guidelines, promote teamwork, and offer assistance and feedback. This concept is in line with the results of Fikriyatii[40] regarding the model's efficacy and applicability in enhancing critical thinking abilities and disposition. By following these procedures, students can develop their own creativity and critical thinking skills while using AI efficiently. In addition to implementing interactive learning activities and enforcing rules regarding the use of AI, teachers can also use feedback to highlight the value of originality and creativity. Self-learning assignments motivate students to use a variety of resources in addition to artificial intelligence.

4.8. Question 8

Question 8. *What are the effects of these strategies to the innovative skills and output of the students?*

4.8.1. Responsible usage

Comparing AI to training wheels on a bike, students are first assisted by it, but in order to fully understand a subject, they have to learn how to ride independently. This analogy emphasizes how crucial it is to promote autonomous thought, teamwork, and creativity to develop innovative abilities and provide original results. This concept supports the findings of Murro[42] who found that effective collaborative partners in the new modality could close the learning gap and increase program penetration by strengthening learner management skills, administering learning modules strategically, and providing remote instructional support. Policies should underscore the value of utilizing AI-generated content as a springboard for innovative ideas, but they should also emphasize the necessity of critical assessment and improvement in order to preserve originality. This concept is in line with the conclusions of Koos[42] which proposes a number of measures that educational institutions can take to allay these worries and optimize the capabilities of AI tools. These measures include encouraging the ethical application of AI, integrating AI into curricula, and creating policies and guidelines related to the use of AI in academic settings. To maintain academic integrity, ethical factors like correct credit and avoiding plagiarism should be included in these policies. As an IT instructor, my ultimate conviction is that, when utilized properly, AI may be a useful tool for students, but it should never take the place of their own critical thinking and creativity.

4.8.2. Implementing stringent policies

Even though AI is a great help, student effort and creativity should always come first. It is crucial to aim for a well-rounded strategy in which AI is used as a tool rather than as a replacement for human labor. Open-ended questions for pupils to show that they truly comprehend the material because they can't just rely on answers from artificial intelligence. Teachers enable students to produce authentic academic work that showcases their unique creativity and intellectual capacity by empowering them to use AI in conjunction with their own strengths. This concept is consistent with Baron[43] indicating that the program seemed to recognize its own limitations. Writing serves many purposes beyond just content creation, such as self-expression, communication, and personal growth, which can continue to motivate people to write even if certain types of writing can be automated. Policies should take into account the possibility that AI can generate false or misleading content, such as faked research and unattributed sources, which could compromise the educational process and make it more difficult for students to understand the material. Institutions can protect themselves against the detrimental effects of AI on academic integrity and guarantee the quality of instructional materials by putting strict regulations in place.

4.8.3. Management

Encouraging students and staff to take part in imaginative tasks and exercises encourages experimentation and idea production, which develops an innovative culture. This theory is consistent with the research results of Fauziya et al.[44] Pupils that possess strong creative thinking abilities perform well when learning new material. As a result, when teaching the kids Kazakh, we gave them unique exercises to gauge their level of proficiency. People Are able to create outputs that are different from content provided by artificial intelligence by putting an emphasis on developing their own innovative ideas and solutions. The effective integration of AI in the workplace requires strategic planning, which includes defining AI's role precisely and coordinating it with corporate goals. Furthermore, making AI literacy training a top priority for staff members guarantees that people can use AI products efficiently. Ensuring the appropriate and ethical use of AI requires a high priority on ethical issues, including resolving biases and privacy problems. All things considered, good management techniques are essential to optimizing AI's advantages while upholding moral principles, inventiveness, and innovation.

4.8.4 Reduction

Students who are encouraged to think critically are better able to assess and analyze data, which produces novel and creative ideas. In classes like statistics, physics, and chemistry, projects are a useful tool for evaluation since they force students to use what they've learned in practical settings. This theory is consistent with the findings of Arisoy[45], which showed that students' critical thinking abilities and virtues improved as a result of their education in the experimental group. Consequences for Practice and Research: In terms of helping students develop their critical thinking abilities and virtues, this study offers an excellent implementation. In addition to testing students' comprehension, these practical activities impede AI's ability to deliver solutions, promoting critical thinking and innovation on their part. All things considered, the application of reduction tactics enables students to acquire critical competencies and generate creative outputs that are not exclusively dependent on artificial intelligence.

5. Conclusion

In conclusion, the anti-dependency teaching strategy is a comprehensive method for empowering tech-savvy pupils in the AI era and is provided by the anti-dependency education approach. It focuses on determining teaching strategies in reducing AI-dependency of Technology-based learners in producing innovative-based academic output. equipping students to be active creators and problem solvers, strengthening critical thinking, promoting multidisciplinary methods, stimulating creativity, addressing ethical issues, creating collaborative learning environments, and emphasizing lifelong learning. This approach empowers students to question, examine, and assess AI-generated outputs, leading to creative solutions. Hands-on activities and project-based learning enhance problem-solving skills, while ethics ensure responsible AI use and societal impact. Interdisciplinary methods provide a deeper understanding of AI and its potential uses. By putting this plan into practice, educators can give students the knowledge and perspective they need to effectively navigate the AI era, producing a new generation of creative thinkers who can transform society for the better.

Conflict of interest

The authors declare no conflict of interest.

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