

# **AI Design Analysis for Diploma Education in Canada**

**Zulfiqar Ali**

Faculty Member

Department of Computer Information System Administration (CISA)

British Columbia Institute of Technology (BCIT)

Burnaby, BC, Canada

[Zali39@bcit.ca](mailto:Zali39@bcit.ca)

## **Abstract**

The study focuses on the declining admission trend in instructor-led synchronous diploma programs in Canada to explore external and internal factors influencing this trend. The paper also suggests an AI design and analysis to attract students to mitigate the declining trend in the Canadian diploma education programs. Internal factors included legacy curriculum design and delivery methods. External factors include AI-powered learning management system (LMS) of AWS, Cisco, Microsoft, Udemy and Coursera. The research aims to investigate the impact of internal and external factors contributing to the declining admission trend in Canadian public diploma education institutions, focusing on IT-related diploma programs. It also aims to propose advanced AI-powered teaching and learning strategies to incorporate in the existing learning systems to address this challenge. Additionally, AI design analysis tools and techniques were used to transform AI-proof into AI-powered learning and teaching systems to attract more students to instructor-led synchronous diploma programs in Canada. The research contributes to understanding the complexities of declining admissions in Canadian public diploma education institutes and provides insights into the intersection of technology, education, and industry demands. Recommendations for curriculum and delivery design were proposed to enhance student interest in IT-related diploma programs. Data was collected through various local, national, and international resources. Qualitative, quantitative, and mixed analysis techniques were employed. The research findings highlight the importance of adapting teaching and learning strategies to align with industry demands and technological advancements to address declining admissions in Canadian public diploma education institutes.

## **Keywords**

AI-powered teaching, AI-proof learning, Effective assessment design, educational factors, educational technology

## **1. Introduction**

Two-year diploma programs are a core component of postsecondary education in many countries, including Canada. These programs are often career-oriented and attract a wide range of learners, many of whom are legally adults. In this research, several factors were identified which include AI-powered and AI-proof tools and techniques with constructive instructional models, feedforward and formative assessment method in line with institutional AI policy and academic integrity. Collaborative, problem-based and critical-thinking were augmented by well balanced approach with OpenAI and localhost applications. This research also gives an insight into how the instructors AI skills can help to control plagiarism, attendance and curiosity to acquire a genuine grading benchmark in Canadian diploma programs. This research also provides development process and demonstration localhost python application associated with in-class teaching, learning and assessment activities to suggest AI solutions for the challenges faced by Canadian diploma programs. Those challenges include the gap between speed of AI adoption by the students and instructors which can be one of the major internal factors impacting on enrolment declining in the Canadian diploma programs..

This research note evaluates whether such programs fall under the scope of adult learning and examines their alignment with adult learning theories. Given the alignment between diploma program structures and adult learning theory, instructional strategies for teaching Python programming should incorporate andragogical approaches. These include AI-powered project-based learning, real-world coding tasks, feedback systems, AI-proof assessment instruments and flexible, self-paced modules that reflect learners' autonomy and prior experience. This optimized Python programming curriculum meets the unique needs of adult learners in a two-year diploma program. It balances AI support with AI-proof evaluations, fosters skill mastery through scaffolded projects, and enhances learning via formative and peer assessment. The integration of andragogy, 5E, and AfL ensures that learning is meaningful, assessable, and future-ready.

## **1.1 Objectives**

The main objective of this report is to provide a comprehensive review of recent advancements in the application of AI and ML for bearing fault detection and diagnosis. Specifically, the report aims to Examine methodologies and algorithms used in recent research. Analyze the deployment techniques and diagnostic frameworks implemented Compare the effectiveness of different AI/ML approach Identify current trends, challenges, and research gap. Evaluate the impact of AI/ML integration on fault detection accuracy and system performance.

## **2. Literature Review**

According to Knowles, adult learners are self-directed, bring prior experiences into learning, are goal-oriented, and value learning that is relevant to their personal or professional lives (Andrade and Valtcheva, 2009). Institutions offering diploma programs often design curricula that emphasize experiential and problem-based learning, which are considered best practices in adult education (Biggs and Tang, 2011). In fields like Information Technology, adult learners increasingly pursue such programs to upskill in areas like Python programming, cybersecurity, and cloud computing (Black and Wiliam, 2009). Two-year diploma programs are usually career-focused, preparing students for immediate entry into the workforce. This outcome-oriented structure reflects adult learning preferences, where learners seek immediate, practical value from their education (Blumenfeld et al., 1991). The instructional model is informed by Knowles' theory of andragogy, which emphasizes self-direction, prior experience, and goal-oriented learning (Andrade and Valtcheva, 2009). The 5E instructional model (Boud and Falchikov, 2006) supports progressive cognitive engagement through Explore, Explain, Elaborate, Evaluate, and Engage phases. These theories are synthesized with evidence-based practices from computer science pedagogy and assessment for learning (AfL). AfL principles are embedded through timely feedback, student reflection rubrics, and forward-looking instructor comments (Bybee, 2014). A well-structured grading scheme supports diverse learning styles, promotes continuous engagement, and mirrors real-world skills needed in programming careers (Cassidy, 2007). Adult learners in diploma programs particularly benefit from frequent, formative assessments that guide progress and retain motivation (Nicol and Macfarlane-Dick, 2006). Overreliance on high-stakes exams can discourage learners, whereas distributed evaluations improve retention and performance (OECD, 2021). The mini project enables learners to apply skills in authentic contexts, fostering creativity and collaboration (Knowles et al., 2015).

## **3. Methods**

This study presents a process of development of user-friendly AI-powered applications for the framework designed in Table 1 below. The AI-powered user-friendly applications were developed to test five phases of 5E instructional model vis-à-vis Assessment for Learning (AfL) model. The AI-powered applications were tested on localhosts with streamlet backend support. For the next stages, the AI-powered applications will be further enhanced to work with cloud platforms and GitHub repository. The curriculum employs AI tools for feedback and support while enforcing AI-proof strategies in assessments. Tools like ChatGPT, Codex, GitHub Copilot, Visual Studio Code, Brightspace (D2L), Microsoft Team, Safe Web Browser, and instructor-designed APP(s) and Extensions are utilized for debugging assistance, syntax clarification, and task explanation. To prevent over-dependence, AI-restricted assessments include locked (safe) browser environments, manual code tracing, oral project defenses, and live group demonstrations. The course implements an integration of 5E and Assessment for Learning (AfL) vis-à-vis AI-powered and AI-proof tools and techniques. Assessment for Learning (AfL) principles are embedded through timely feedback, student reflection rubrics, and forward-looking instructor comments (Bybee, 2014). This model emphasizes both formative and summative evaluation. Quizzes provide continuous feedback and reinforce learning (Bybee, 2014) while the mid-term and final exams assess cumulative understanding and synthesis. Labs and skill-based exams focus on hands-on practice and debugging proficiency, essential for coding literacy (Merriam and Bierema, 2013). The mini project enables learners to apply skills in authentic contexts, fostering creativity and collaboration (Knowles et al.,

2015). AI-powered AI-proof framework for the implementation of 5E + AfL instructional model is proposed in Table 1 below:

Table 1. AI-powered/Proof 5E/AfL Instructional Framework (proposed)

5E Phase Weight (%)	Objectives	AI-Powered Components	AI-Proof Components	Augmented AI Tools	Localhost Apps
Engage (5)	Concepts building-1	Adaptive Analysis Adaptive Polls Diagnostic	Zero	OpenAI/ChatGPT Localhost APPs	Adaptive Polls
Explore (45)	Concepts building-2	Adaptive learning Feedforward	Summative Self with Rubrics Safe Browser LMS Localhost APPs	OpenAI/ChatGPT Localhost APPs	Adaptive Quizzes Self-assessment Feedforward Worksheet-A
Explain (30)	Skill building (Hands-on)	Adaptive Learning Feedforward	Formative Self with Rubrics Localhost APPs	OpenAI/ChatGPT Localhost APPs VS, Copilot, GitHub Codex, Streamlit	Adaptive Labs Self-assessment Feedforward Worksheet-B
Elaborate	Teamwork Comm Doc	Zero	Peer with Rubrics Summative Formative Localhost APPs	Localhost APPs VS, Copilot, GitHub Codex, Streamlit, Jupyter	Peer-Assessment Instructor-Assessment Worksheet-C
Evaluate	Assessment	Zero	Diagnostics Formative Summative Self Peer LMS with Safe Browser	Zero	LMS

The proposed framework addresses the AI-powered and AI-proof design issues mentioned in the introduction section above. The main theme of the designs are AI-power learning and AI-proof assessments features. Theory and skill Learning activities are powered by using OpenAI adaptive tools and techniques through well-designed worksheets. The assessment activities, self, peer, and instructor-led, are powered with AI-proof tools and techniques by using Institute provided LMS tools as shown in Table 1 above. According to Bybee, R. W (Bybee, 2014), the 5E model emphasizes both formative and summative evaluation. Quizzes provide continuous feedback and reinforce learning. The proposed AI-powered and AI-proof framework suggest the assessment distributions as shown in the Figure 1 below:

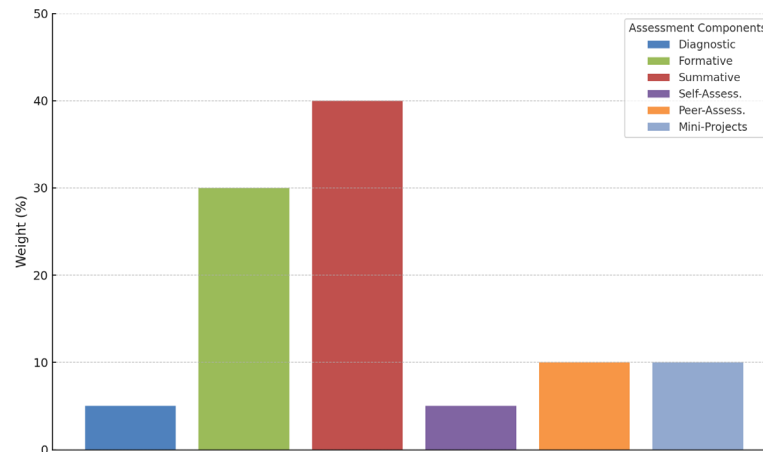


Figure 1. Assessment Types and Framework Distribution

### 3.3 Self-Assessment in Adult Education

Adult learning theory emphasizes learner independence, self-direction, and the importance of reflective practice (Andrade and Valtcheva, 2009). Self-assessment aligns closely with these principles by allowing learners to monitor and evaluate their progress, identify areas of improvement, and engage in goalsetting (OpenAI, 2023). While the optimal weighting of self-assessment can vary based on learning outcomes and institutional policy, research suggests a range of 5% to 10% of the final grade is appropriate in adult education settings (Tough, 1979). A 5% weighting is commonly implemented in competency-based and applied learning contexts such as two-year diploma programs (Van Zundert et al., 2010). These strategies help maintain assessment integrity while fostering a learner-centered environment (Topping, 2009). The intensive use of ChatGPT by Canadian students suggests giving more control to them that emphasize self-regulation, applied learning and professional skill development at diploma level program. Table 1 model suggests a contribution of 5% to the final grade and is supported by the above research and AI model requirements. AI-powered self-assessment rubric instrument aligned with PCEP-Certified Entry-level Python Programmer certifications for explore and explain phases (given in Table 1) was designed as shown in Table 2 below:

Table 2. Suggested AI-powered Self-assessment Rubrics

Criteria	Excellent (5 pts)	Good (4 pts)	Satisfactory (3 pts)	Needs Improvement (2 pts)	Poor (1pt)	Contribution (%)
Readiness and Motivation	I am highly motivated and eager to begin learning Python.	Motivated and shows interest in the course.	Somewhat motivated; needs direction.	Low motivation and limited interest.	Uninterested or resistant to starting.	20%
Prior Knowledge Awareness	Clearly identify what they know and want to learn.	Can describe prior knowledge with some clarity.	.Some awareness of what they know.	Minimal understanding of prior knowledge.	No reflection on previous learning.	20%
Goal Setting	Sets clear, achievable goals for learning Python.	Has general learning goals.	Goals are vague or incomplete.	Goals lack relevance or focus.	No learning goals set.	20%

Self-Reflection	Thoughtfully reflects strengths and areas for growth.	Provides a basic reflection.	Some effort at reflection shown.	Minimal reflection or unclear thoughts.	No reflection included.	20%
Engagement in Intro Activities	Fully engages in warm-up or introductory tasks.	Participate actively in most tasks.	Completes basic tasks with guidance.	Needs prompting to participate.	No participation in activities.	20%

**Scoring Guide:**

Maximum Score = 20 points

Final Score = (Points Earned ÷ 20) × 5%

Table 2 rubrics were augmented with a user-friendly AI-powered self-assessment application which was tested on the local host. AI-powered self-assessment application was designed to be used by students for all modules learning activities of PCEP-Certified Entry-level Python Programmer course. This application works with engagement and explore phases of 5e instructional model. The most powerful feature of the application is the adaptive nature of personal learning with the challenge and excitement of securing and justifying self-granted hundred percent marks.

### 3.4. Peer Assessment in Adult Education

Peer assessment encourages learners to critically evaluate the work of others, promoting deeper understanding and self-reflection. In adult learning environments—where learners are typically more autonomous and experienced—peer assessment aligns well with andragogical principles (OpenAI, 2023). Empirical studies suggest that peer assessment typically contributes between 5% and 20% of the final grade in adult learning or higher education settings. The most effective peer assessment implementations assign between 10% and 15% of the total grade to ensure seriousness without causing grade inflation (Prince, 2004). A balanced approach, arguing that peer assessment should complement, not replace, instructor evaluation (OpenAI, 2023). In practice, the percentage of peer assessment depends on the level, nature and reliability of course and peer review method. Table 1 model suggests, to be fair and transparent, an AI-powered peer-assessment rubrics design with the contribution of 10 % in the final course grade for active participation, critical thinking, problem-solving, collaboration and AI-powered reflection empowerment with academic integrity and institution AI policies. AI-powered self-assessment rubric instrument aligned with PCEP-Certified Entry-level Python Programmer certifications for elaborate phase was designed as shown in Table 3 below:

Table 3. Suggested AI-powered Peer-assessment Rubrics

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (2)	Poor (1)
Code Contribution & Accuracy (25%)	Writes complete, clean, and correct code; solved problems independently	Significant working code with minor issues	Partial or flawed code with effort	Minimal code with limited logic	No working code
Debugging and Testing Support (25%)	Actively debugged and tested others' code and provided solutions	Detected bugs and gave helpful feedback	Attempted debugging with some assistance	Minimal testing or missed errors	No involvement in debugging

Constructive Peer Feedback (20%)	Gave clear, specific, and helpful suggestions	Mostly useful suggestions with clarity	Basic or vague feedback	Unclear or unhelpful input	Dismissive or no feedback
Communication and Engagement (15%)	Collaborated and communicated effectively throughout AI-power Worksheet-B	Consistent participation and communication	Participated but less engaged	Minimal involvement	No communication
Demo & Documentation (15%)	Detailed README, code comments, and full demo AI-power Worksheet-B	Clear documentation and walkthrough	Basic or partial explanation	Weak or incomplete documentation	No documentation or failed demo

Table 4. Suggested Contribution to Final Grade (10%)

Peer Score (out of 25)	Converted Final Grade (%)
23–25	10%
21–22	9%
17–20	8–5%
14–16	4–2%
Below 14	1%

Table 3 and Table 4 rubrics were augmented with a user-friendly AI-powered peer-assessment application which was tested on the local host. AI-powered self-assessment application was designed to be used by students for all modules learning activities of PCEP-Certified Entry-level Python Programmer course. This application works with explain and elaborate phases of 5e instructional model. The most powerful feature of the application is the adaptive nature of personal learning with the challenge and excitement of securing and justifying peer-assessment marks.

### 3.5 Instructor-led Assessments

As the framework given in Table 1 above suggests a balanced approach of instructor-led synchronous assessments that contribute 80 % of the final grade. As research shows that 5 % to 10 % should be contributed for self-assessments and peer-assessments. The proposed model suggests two self-assessments live in explore and explain phases and one peer-assessment lives in elaborate phase which contribute in total 20 % of the total final grade. The proposed model emphasizes diagnostic, summative and formative assessments for Instructor-led evaluation supported by AI-powered by using OpenAI and customs designed apps and AI-proof by using institutional Learning Management System (LMS). To maintain academic integrity and in compliance with institutional policies, quizzes, midterm and final exams (Explore and portions of Explain and Elaborate phases), the proposed framework shown in Table 1 above suggests the use of Institutional' Leaning Management System (LMS). The questions will be posted through the LMS bank randomly. Each student receives a different set or completely shuffled questions for fairness and transparency. The students receive immediate feedback as soon as they click the submission button. The feedback contains all correct and incorrect questions with answers and explanations.

### 3.6 Worksheets Design

There are three AI-powered worksheet applications that were developed and tested for every phase of 5E instructional model vis-vis Assessment of Learning (AfL) empowerment. The AI-powered worksheets as depicted in Table 1 above. The worksheets applications act like a daily in-class-logbook and step-by-step lab manual with the support of adaptive technology for personalized learning.

#### 4. Data Collection

The secondary data were collected from various national and international statics provided by Statistics Canada, World Economic Forum, Canada's Top 100 Employers, KPMG Canada and OpenAI. According to KPMG Canada (2024), the adoption of generative AI tools among Canadian postsecondary students has increased significantly. A recent survey revealed that 59% of students regularly use AI for coursework. However, 67% of students expressed concerns that AI reduces knowledge retention, while 65% felt it equates to cheating. These mixed sentiments indicate both opportunities and ethical tensions in AI's role in higher education. Figure 2 below summarizes these findings using color-coded categories:

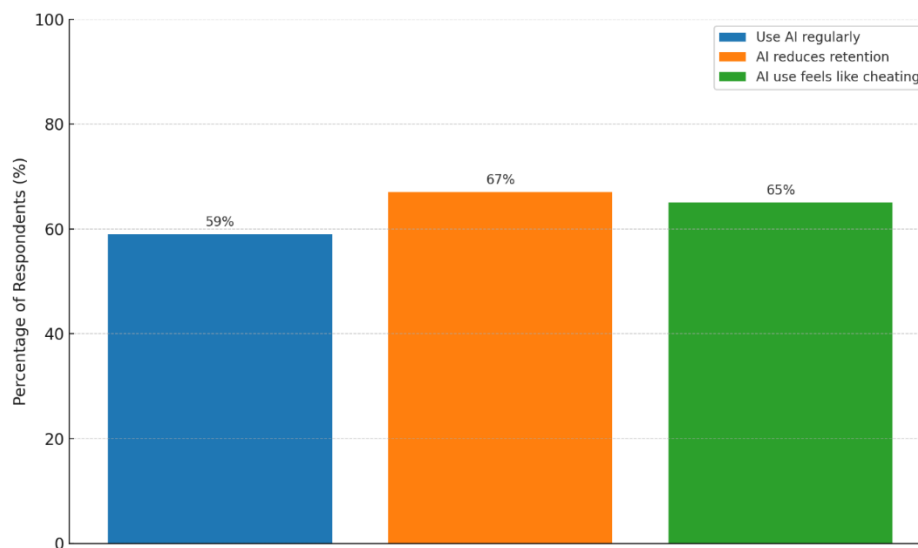


Figure 2. AI Usage by Canadian Postsecondary Students – KPMG Insights

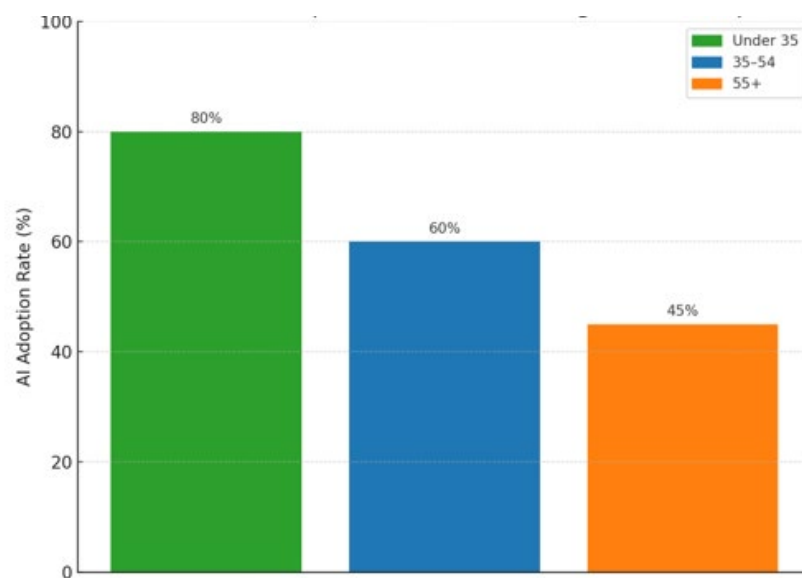


Figure 3. AI Usage by Canadian Postsecondary Instructor – KPMG Insights

Figure 3 indicates that age is not only the factor that impacts on student's learning process but also the speed of adaptation of AI by the instructor. It is very interesting inverse relations between the instructor age and the rate of adoption of AI in Canadian diploma programs.

## 5. Results and Discussion

Correlation Heatmap of Student Assessments was performed for 30 students of winter 2024 term before AI augmentation into the Python programming course. The assessment included python modules activities, hands-on labs, quizzes, midterm, final, and skill exams. The heatmap below reveals that module participation correlates positively with final grades ( $r = 0.62$ ). Skill exams ( $r = 0.74$ ) and final exams ( $r = 0.57$ ) also show meaningful correlations with final performance. These findings suggest that regular interaction with formative assessments significantly contributes to academic success (Figure 4).

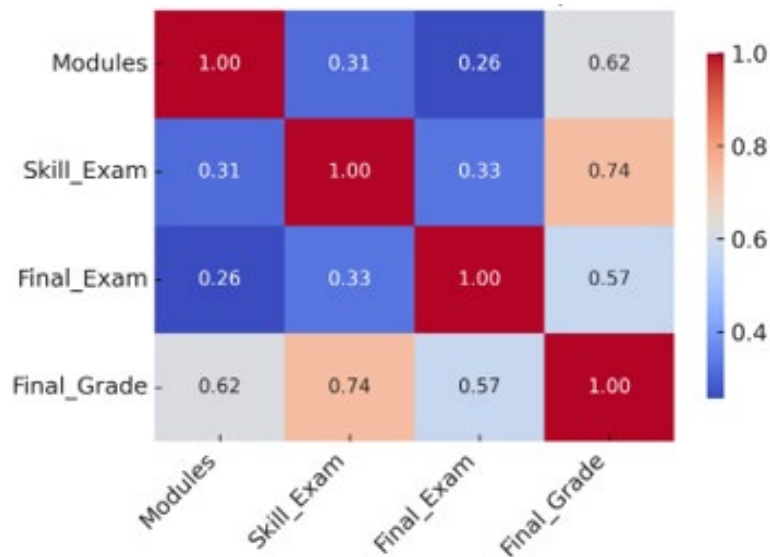


Figure 4. Correlation Heatmap of Performance Indicators (Winter 2024)

Correlation Heatmap of Student Assessments was performed for 30 students of winter 2025 term after AI augmentation into the Python programming course. The assessment included python modules activities, hands-on labs, quizzes, midterm, final, and skill exams. The correlation heatmap illustrates strong associations between AWS Academy Module scores and final grades, as well as Final Exam performance. Module scores correlate with the final grade at 0.43, while Final Exam scores correlate at 0.58. These values support the notion that continuous engagement throughout the course significantly predicts final outcomes (Figure 5).



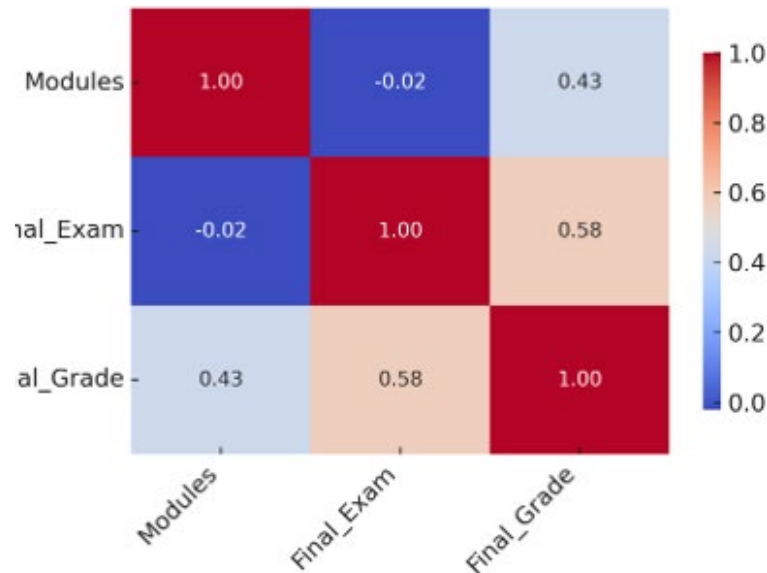


Figure 5. Correlation Heatmap of Performance Indicators(Winter 2025)

Table 5. Comparative Analysis of Student Performance

Parameters measured	Winter 2024 (Before AI augmentation)	Winter 2025 (After AI Augmentation)
Mean Module Score	94.81	86.95
Mean Final Exam Score	70.58	54.50
Mean Final Grade	81.40	81.40

Students in Winter 2024 demonstrated high levels of module engagement and final exam preparedness. In contrast, Winter 2025 students showed a significant decline in final exam performance (Table 5). The results show that the intervention of AI-powered and AI-proof tools and techniques into the 5E and AfL instructional models may lead to performance-based grade reductions for students who are frequently absent, rely on unethical shortcuts such as plagiarism, or fail to engage with AI-driven learning supports. Recent studies suggest that AI can serve as both an instructional support and a gatekeeper of academic integrity (Eaton 2023; Panadero et al. 2016). AI-powered instructional tools offer individualized learning paths, real-time hints, and feedback loops that support metacognitive skills (Andrade and Valtcheva 2009).

Figure 6 screenshot shows AI-powered localhost apps for each 5E phase mapped with three worksheets. Worksheet apps were designed, developed and tested on localhost 8501 port successfully as shown in Figure 8 below. The apps were coded in Python version 3.12.5.

Elaborate_Phase_Worksheet_C_App.zip	2025-06-21 7:35 PM	Compressed (zipp...	1 KB
Explian_Phase_Worksheet_B_App.zip	2025-06-21 7:35 PM	Compressed (zipp...	1 KB
Explore_Phase_Worksheet_A_App.zip	2025-06-21 7:35 PM	Compressed (zipp...	1 KB

Figure 6. Screenshot of AI-powered Localhost Worksheets Apps

Figure 7 screenshot shows localhost apps for each 5E phases mapped with three self-assessment rubrics apps. Slf-assessment apps were designed, developed and tested in Python version 3.12.5.

AI_Plagiarism_LLM_Cheker.zip	2025-06-21 6:25 AM	Compressed (zipp...	5 KB
Elaborate_Phase_Self_Assessment_App.zip	2025-06-21 6:21 PM	Compressed (zipp...	2 KB
Engage_Phase_Self_Assessment_Full_App...	2025-06-21 6:16 PM	Compressed (zipp...	3 KB
Explain_Phase_Self_Assessment_App.zip	2025-06-21 4:48 PM	Compressed (zipp...	2 KB
Explore_Phase_Self_Assessment_App.zip	2025-06-21 6:19 PM	Compressed (zipp...	2 KB

Figure 7. Screenshot of AI-powered Localhost Self-assessment Apps

Figure 8 screenshot shows the app runs on the localhost at port no. 8501. The apps can be updated to run on cloud and repository platforms for distributed systems and applications.

```

Command Prompt - streamlit
Microsoft Windows [Version 10.0.26100.4349]
(c) Microsoft Corporation. All rights reserved.

C:\Users\zali39>cd C:\Users\zali39\Desktop\FALL-2025\ioem\chatGPT-paper\AI_Plagiarism_LLM_Cheker
C:\Users\zali39\Desktop\FALL-2025\ioem\chatGPT-paper\AI_Plagiarism_LLM_Cheker>streamlit run app.py

You can now view your Streamlit app in your browser.

Local URL: http://localhost:8501
Network URL: http://192.168.1.69:8501

```

Figure 8. Screenshot of AI-powered Localhost App in action

```

zali39
write a program in python for simple calculator

GitHub Copilot
Here's a simple calculator program in Python that supports addition, subtraction, multiplication, and division:

def add(x, y):
    return x + y

def subtract(x, y):
    return x - y

def multiply(x, y):
    return x * y

def divide(x, y):
    if y == 0:
        return "Error: Division by zero"
    return x / y

print("Simple Calculator")
print("Select operation:")
print("1. Add")
print("2. Subtract")
print("3. Multiply")
print("4. Divide")

choice = input("Enter choice (1/2/3/4): ")

num1 = float(input("Enter first number: "))

```

Figure 9. Screenshot of AI-powered localhost Copilot Application's Feature

Figure 9 screenshot shows the augmentation of AI-powered Copilot Application. Copilot is embedded with GitHub and Microsoft Visual Studio. The copilot app provides a real time feedforward during Python coding. Th copilot not only guide but also suggest solutions and help in error handling fixing during code writing. Figure 10 screenshot below depicts a user friendly and power plagiarism detection app with custom threshold value in line with institute academic integration policy. The students' worksheets report can be uploaded in Python format (.py) to check.

The interface for the AI-powered Localhost Plagiarism Detection Application includes the following elements:

- A text input field labeled "Enter your OpenAI API key (not stored):" with a toggle icon on the right.
- A section titled "Upload Python files from students" containing a drag-and-drop area with the text "Drag and drop files here" and "Limit 200MB per file • PY", and a "Browse files" button.
- A slider control labeled "Set plagiarism flag threshold (%)" with a range from 50 to 100. The slider is currently set at 70, indicated by a red dot and the number "70" above it.

Figure 10. Screenshot of AI-powered Localhost Plagiarism Detection Application

The interface for the AI-powered Localhost Explore-phase Application's Feature includes the following elements:

- A "Select Module" dropdown menu currently showing "Module 1: Basic Concepts".
- A section titled "Theory: Module 1 – Basic Concepts".
- A text block explaining "Variables and Input/Output Python allows you to store data in variables using the assignment operator" followed by a code example:

```
= .  
  
name = input("Enter your name: ")  
print("Hello", name)
```
- A text block explaining "Indentation Python uses indentation to group blocks of code." followed by a code example:

```
if True:  
    print("Correctly indented")
```

Figure 11. Screenshot of AI-powered Localhost Explore-phase Application's Feature

The students can choose a module from the dropdown menu (Figure 11). The basic topics are contained in the module popup for reading and building concepts. The module is supported by adaptive quiz for personalization learning. The students are allowed to take maximum two attempts to hot 100 % (10% contribution to the final grade) self-assessment marks as shown in the Figure 12 and Figure 13 below:

The interface for the AI-powered Localhost adaptive Quiz Application's Feature displays two quiz questions:

**Q1: What is the correct syntax to output 'Hello World' in Python?**

Answer 1

- ☒ echo 'Hello World'
- ☐ print('Hello World')
- ☐ printf('Hello World')
- ☐ cout << 'Hello World'

**Q2: Which character is used in Python to indicate a comment?**

Answer 2

- ☒ //
- ☐ /
- ☐ /\*
- ☐ —

Figure 12. Screenshot of AI-powered Localhost adaptive Quiz Application's Feature



Figure 13. AI-powered Localhost Self-Assessment Rubric App's Feature (Worksheet-A)

Figure 14 screenshot is the area where students write their reflection followed by progress report generation.

👉 Reflection (What did you learn?)

Academic use only | AI-powered formative feedback system

Figure 14. AI-powered Localhost Report Generation App's Feature

In Figure 15 below, a portion of the report generated by this app is shown. The most powerful full features of the part are explanation of correct answer. With this feature students can improve their grade by 2<sup>nd</sup> attempt.

Name:

Student ID:

Module: Module 1: Basic Concepts

Date: 2025-06-25

**Quiz Results**

Score: 0 out of 10

Q1: What is the correct syntax to output 'Hello World' in Python?

Your answer: echo 'Hello World'

Correct answer: print('Hello World')

Explanation: This question assesses understanding of basic syntax or logic.

Figure 15. AI-powered Portion of Report

Figure 16 shows the type of files that can be uploaded through this app.

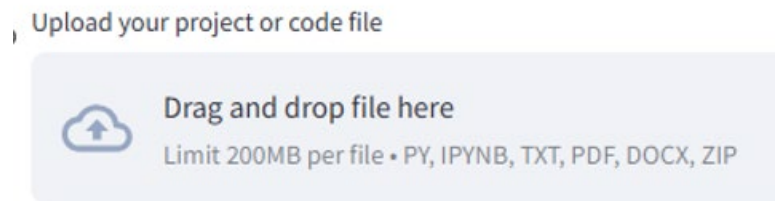


Figure 16. AI-Powered Upload Project or Python Code File

Figure 17 below is the powerful feature of the app where students reflect by peer-assessment for elaborate phase of 5E instructional model.

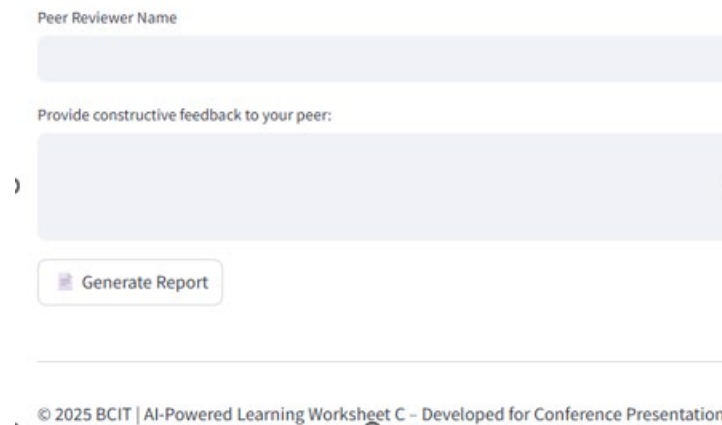


Figure 17. AI-Powered Peer-Assessment Application's Feature

## 5. Recommendations

Canadian Diploma Institutions should chalk out a clear cut and communicate AI-powered and AI-proof learning and teaching policy. Canadian Diploma Institutions should provide a skillful mentorship specifically those instructors who are above 50's. Canadian Diploma instructors should augment AI tools and techniques with legacy pedagogical framework Canadian diploma instructors should develop and deploy AI-powered learning instruments and AI-proof transparent assessment rubrics to reinforcement continuous learning.

Canadian diploma instructors should develop and deploy localhost apps vis-à-vis OpenAI tools and techniques to make it compliance with privacy policy.

## 6. Conclusion and Future Research

The dual integration of AI-enhanced learning and AI-proof assessment promotes academic integrity and personalized instruction. That integration must be seen not only as a tool for acceleration but also as a filter for accountability and integrity. Students disengaged from the learning process—by absence, dishonesty, or negligence—will likely see their grades diminish under such systems. The reduction in the gap of AI adoption rate between students and instructors may improve the student's interest in the program to cope with challenge of declining enrolment trend in Canadian diploma programs. An accelerated hiring of AI-powered young instructors can fill this gap and help to meet the AI-oriented manpower requirements by the current and future employers. The localhost apps designed, developed and demonstrated in this paper can be upgraded to tightly coupled with cloud and repository distributed platforms.

## References

Andrade, H. and Valtcheva, A., Promoting learning and achievement through self-assessment, *Theory into Practice*, vol. 48, no. 1, pp. 12–19, 2009.

- Biggs, J. and Tang, C., Teaching for Quality Learning at University, 4th ed., McGraw-Hill Education, Maidenhead, UK, 2011.
- Black, P. and Wiliam, D., Developing the theory of formative assessment, *Educational Assessment, Evaluation and Accountability*, vol. 21, no. 1, pp. 5–31, 2009.
- Blumenfeld, P. C., Soloway, E., Marx, R. W., Krajcik, J. S., Guzdial, M. and Palincsar, A., Motivating project-based learning: Sustaining the doing, *supporting the learning*, *Educational Psychologist*, vol. 26, no. 3–4, pp. 369–398, 1991.
- Boud, D. and Falchikov, N., Aligning assessment with long-term learning, *Assessment & Evaluation in Higher Education*, vol. 31, no. 4, pp. 399–413, 2006.
- Bybee, R. W., The BSCS 5E Instructional Model: Creating Teachable Moments, *NSTA Press*, Arlington, VA, 2014.
- Cassidy, S., Assessing 'inexperienced' students' ability to self-assess: Exploring links with learning style and academic personal control, *Assessment & Evaluation in Higher Education*, vol. 32, no. 3, pp. 313–330, 2007.
- Eaton, S., Academic Integrity in the Age of AI: Risks and Recommendations, *International Journal for Educational Integrity*, vol. 19, no. 1, pp. 1–14, 2023.
- Guzdial, M. and Ericson, B., Introduction to Computing and Programming in Python: A Multimedia Approach, Pearson Education, Boston, MA, 2007.
- Knowles, M. S., Holton, E. F. and Swanson, R. A., The Adult Learner: The Definitive Classic in Adult Education and Human Resource Development, 8th ed., Routledge, New York, NY, 2015.
- Merriam, S. B. and Bierema, L. L., Adult Learning: Linking Theory and Practice, *Jossey-Bass*, San Francisco, CA, 2013.
- Nicol, D. J. and Macfarlane-Dick, D., Formative assessment and self-regulated learning: A model and seven principles of good feedback practice, *Studies in Higher Education*, vol. 31, no. 2, pp. 199–218, 2006.
- OECD, *Adult Learning and Technology in the 21st Century*, *OECD Publishing*, Paris, France, 2021. Available at: <https://doi.org/10.1787/26157354>
- OpenAI, Teaching with AI: A Guide for Educators, OpenAI, 2023. Available at: <https://openai.com/education>.
- Panadero, E., Brown, G. T. and Strijbos, J. W., The future of student self-assessment: A review of known unknowns and potential directions, *Educational Psychology Review*, vol. 28, no. 4, pp. 803–830, 2016.
- Prince, M., Does active learning work? A review of the research, *Journal of Engineering Education*, vol. 93, no. 3, pp. 223–231, 2004.
- Sargeant, J., Mann, K., van der Vleuten, C. and Metsemakers, J., 'Directed' self-assessment: Practice and feedback within a social context, *Journal of Continuing Education in the Health Professions*, vol. 28, no. 1, pp. 47–54, 2008.
- Topping, K. J., Peer assessment, *Theory Into Practice*, vol. 48, no. 1, pp. 20–27, 2009.
- Tough, A., The Adult's Learning Projects: A Fresh Approach to Theory and Practice in Adult Learning, *Ontario Institute for Studies in Education*, Toronto, Canada, 1979.
- Van Zundert, M., Sluijsmans, D. and Van Merriënboer, J., Effective peer assessment processes: Research findings and future directions, *Learning and Instruction*, vol. 20, no. 4, pp. 270–279, 2010.
- Canada's Top 100 Employers, British Columbia Institute of Technology (BCIT), 2024. Available at: <https://reviews.canadastop100.com/top-employer-bcit>.
- Statistics Canada, Postsecondary staff and faculty age demographics, Statistics Canada, 2021. Available at: <https://www.statcan.gc.ca/>

## Biography

**Zulfiqar Ali** is currently a faculty member of Computer Information Systems and Administration (CISA) of British Columbia Institute of Technology (BCIT), Burnaby, BC, Canada. He acquired his MEng in Computer Networks and MBA in Technology and Innovation Management. His research interests include AI-powered teaching and Learning Technologies, Migration from AI-proof to AI-powered educational system, Cloud Computing, Information and Communication Technologies. He has presented and published many articles in internationally referred journals and conferences such as IEEE. He has many globally recognized industrial certifications such as OpenAI, Cisco, Microsoft, AWS, ITLS, Palo Alto, Institute of Python. Currently he is running AWS, Cisco and Python Academies at BCIT, BC, Canada.