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Systematic AI-Based Management Tools for Industry on Campus (IoC): Towards Automation and Smart Reporting in Malaysian Community Colleges

Mohd Imran Bin Ahmad Kamal[1,*], Mohd Azha Bin Ismail[2], Rosnizam Bin Kamis[2]

[1]Industry On Campus Unit, Arau Community College, Perlis, Malaysia
[2]Management Unit, Arau Community College, Perlis, Malaysia
Email: [1,*]mohdimran@kkarau.edu.my, [2]mohdazha@kkarau.edu.my, [3]rosnizam@kkarau.edu.my
Corresponding Author Email: mohdimran@kkarau.edu.my

Abstract-The concept paper outlines a strategic approach to implement Artificial Intelligence (AI) and Robotic Process Automation (RPA) systems for managing and documenting Industry On Campus (IoC) programs at Malaysian community colleges through Kolej Komuniti Arau as a pilot site. The research employs design-based research (DBR) to develop and test an AI system that utilizes Microsoft Power Automate and ChatGPT to automate data processing and generate reports and provide real-time analytics. The literature review spanning 2020–2025 demonstrates that these technologies will decrease administrative workloads while improving reporting precision and increasing institutional openness. The expected outcomes include up to 50% time savings in documentation, increased stakeholder engagement, and alignment with national digital transformation agendas like MyDIGITAL and the National 4IR Policy. The paper presents an operational and expandable framework for AI-based TVET administration which provides guidance for both policy development and implementation to support enduring educational governance innovation.

Keywords: AI-Assisted Documentation; Industry on Campus (IoC); Robotic Process Automation (RPA); ChatGPT in Education; TVET Management; Smart Reporting; Educational Automation; Malaysia MyDIGITAL.

1. INTRODUCTION

Strategic industry-campus partnerships enable companies to establish operations directly on educational grounds so students gain practical work experience through real-world training, Rahman, R. (2021). Malaysian community colleges including Arau Community College implement Industrial on Campus programs under the Technical and Vocational Education and Training (TVET) framework to develop practical skills and employment readiness for graduates. The establishment of on-campus company training facilities and service outlets through IoC programs enables students to work on actual industry projects while studying. The concept of IoC was established to resolve skill-job specification gaps by bringing industry participation directly into educational campuses. The Malaysian Ministry of Higher Education supports the IOI model because it produces industry-ready talent through embedding job skills directly.

The IoC concept has been successfully implemented through pilot programs at Sungai Petani Community College through services like campus-based laundry operations and automotive workshop activities that demonstrate its applications. The establishment of these programs faces major administrative barriers when trying to implement them. College staff currently depend on manual documentation and informal data management systems to support their IoC arrangements. The coordinators at Arau Community College along with other similar institutions must manage paper forms and spreadsheets together with emails to monitor industry partner operations and student involvement as well as track training records and achievement results.

The time-consuming and error-prone manual workflows result in inefficient documentation which produces delayed reporting according to Bhardwaj, V. and Kumar, M (2025). The absence of an integrated digital system results in restricted real-time access to IoC program data which makes it difficult for college administrators to obtain current student analytics as well as industry partner contribution reports. The problems created by these issues prevent sound decision-making while obscuring the actual effects of IoC initiatives. The IoC model requires modern technology solutions to handle documentation bottlenecks in order to achieve sustainability and growth. The following concept paper suggests using Artificial Intelligence tools to establish a systematic method for documenting IoC programs. AI tools employing large language models together with robotic process automation aim to optimize administrative procedures while reducing errors and providing instant data insights for IoC programs. This introduction explains the IoC concept and its application in Malaysian community colleges before moving on to explain the current problems in IoC management and the objectives of the proposed AI system as well as relevant literature and methodology with expected outcomes and significance and scope and limitations of the study.

The current management of IoC programs depends on manual data handling. The collection of attendance sheets and training records and feedback forms from students and industry coaches and department offices requires staff to manually re-enter identical information across various reports. The manual process of data aggregation proves to be both inefficient and prone to transcription errors. According to studies the implementation of robotic process automation (RPA) in academic record-keeping systems produces “significant time savings [and] error reduction” as demonstrated in Bhardwaj, V. and Kumar, M (2025). The documentation from one semester in IoC includes various documents such as MoUs and training schedules and assessment forms and human handling of these volumes leads to potential delays and mistakes. A higher education institution recorded that implementing automated daily activity sheet collection produced better data management efficiency and timeliness and organization which demonstrates the current manual processes

create reporting delays, TOMA Marian- Vlăduț (2023). College staff face difficulties in keeping up with paperwork because of which student internship hours and industry satisfaction ratings may not get consistent documentation.

The process of gathering information about IoC activities becomes difficult because the data lacks centralization which makes reporting and document preparation cumbersome. The Polytechnic & Community College Department requires staff to manually collect data from multiple files before creating an IoC progress report. The inefficient data handling process takes valuable time from staff members and causes extended delays in delivering information to stakeholders. Most colleges generate their IoC reports monthly or quarterly, but these reports are released weeks after the actual period has ended which prevents stakeholders from making prompt decisions about issues or opportunities. Different IoC projects use incompatible documentation templates that make it difficult to merge their information. Reports generated without automation tend to either exclude important details or contain information that does not match. RPA implementations in education demonstrate their capacity to create reports and dashboards through automation thus liberating educators from boring work. The absence of appropriate tools makes IoC program coordinators handle excessive workload and delays their reporting activities.

Digital Economy Blueprint issued by Malaysia demonstrates how educational institutions need to cut administrative workloads and enhance digital workflows to meet their targets. Present manual documentation system for IoC operates against the objectives which the government has established. Real-time analytics represents a vital limitation in current practices because program metrics from IoC cannot be tracked in real time. Data related to student performance and industry partner engagement and project outcomes stay locked within separate documents. College administrators require interactive dashboard and analytics tools to answer fundamental questions about IoC program activity such as the number of students participating in internships, or the highest employment offers from industry projects. Current decision-making approach depends on outdated reports because it operates reactively. The implementation of data-driven insights would substantially improve IoC program management because it would help determine successful partnerships and necessary curriculum skill enhancements. National 4IR Policy of Malaysia stresses efficient education delivery while advocating for a centralized open education database to provide timely informed choices.

A centralized data view does not exist in the current IoC management framework. Industry partners lack a real-time feedback system because they cannot access student assignments or project progress through instant login access. Real-time analytics together with transparency play a vital role in building and maintaining industry trust and engagement. This identified problems consist of three main issues which is staff face overwhelming workloads and delays because of manual data handling with errors, current documentation and reporting system creates slow and infrequent delivery of IoC outcomes and real-time data analytics is absent which prevents effective IoC program management and continuous improvement. The need for an AI-driven documentation system arises from these challenges because it will automate data collection and standardize and accelerate reporting and provide live analytics dashboards for IoC stakeholders.

The proposed AI-assisted documentation system addresses these problems through the following main objectives. All the objectives are strategically designed to streamline the IoC administrative workflow, minimize human errors, and enhance data-driven decision-making across institutional and industry partnerships. The following objectives are: 1) To enhance administrative efficiency through automation of repetitive work activities including data entry and file organization alongside report compilation. 2) To combined of RPA bots with AI validation systems will reduce errors in IoC record-keeping by automating data transfer and verification processes. 3) To create dashboards and automatic reporting features which provide users with current metrics for IoC programs. 4) To engage AI tools including natural language generation to assist in creating official documents together with industry correspondence for IoC activities. 5) To automated and centralized data system will improve stakeholder engagement and transparency through better data visibility. 6) To proposed solution and implement best practices of digital governance together with data security and scalability standards to support Malaysia's MyDIGITAL and 4IR initiatives.

The project's success would establish Arau Community College's IoC management as a pilot example to prove AI automation works in line with national blueprints. The objectives unify to create an intelligent IoC program management system which combines efficiency with accuracy and provides valuable insights. Through these achievements the college will achieve its vision of IoC by concentrating on student-industry connections rather than document management.

Recent literature explores Industry on Campus as a new method to enhance TVET enhancement. Rahman (2020) documented the implementation of an IoC pilot at Sungai Petani Community College where a campus-based laundry service was run in partnership with industry. This conceptual paper explained that the IoC model operated under the national Polytechnic and Community College Department's strategy to produce high-skilled graduates through direct industry exposure. The pilot documentation presents an example of IoC best practice through its demonstration of how well-planned industry-campus collaborations enable students to gain practical training that matches real-world skills. The "Prodigy Autohauz" project at Sungai Petani Community College serves as an IoC case study according to Fauzi (2021) because it established an automotive service center on campus to train students in vehicle maintenance. Fauzi's report identifies strategic elements for IoC success through the establishment of clear college-industry partner roles and curriculum integration of IoC activities. The research demonstrates that IoC programs lead to beneficial educational results and better job prospects for graduates while requiring additional administrative work. The authors Rahman and Fauzi stressed documentation importance because both IoC pilots needed tracking of student participation hours and industry feedback and operational results as "pilot project documentation" for this new TVET concept. The two pilot papers failed to provide detailed guidance about efficient documentation management. Our research fills this knowledge gap by implementing AI tools to manage IoC data systematically based on the established best practices for IoC.

A substantial amount of research has emerged during the last few years to study how AI affects educational administration and leadership. Sposato (2025) establishes a detailed classification of AI applications in higher education leadership which shows Administrative Efficiency as the main area where AI demonstrates substantial impact. AI technologies perform administrative tasks automatically while optimizing scheduling systems and providing decision support functions to enable staff members to focus on strategic work. Machine-learning scheduling systems according to Sposato optimize class timetables and room assignments which results in conflict reduction and substantial administrative time savings. The implementation of AI-based scheduling has proven successful in reducing administrative work by 40% while enhancing resource management according to case studies. Industry On Campus (IOC) scenario can benefit from AI because it streamlines student rotation scheduling with industry partners and facility usage coordination. Smith and Anderson (2020) presented early perspectives about AI's educational potential which included improved teaching and administrative processes through enhanced efficiency and personalization. Available research demonstrates that AI integration in educational management will transform administrative operations and create new decision-making approaches. The implementation of these benefits depends on specific conditions. Implementation of AI in institutional settings demands strategic planning and staff capacity development for working with AI systems together with ethical framework implementation, Montenegro-Rueda et al. (2023). The research study follows the existing literature by concentrating on AI applications for administrative efficiency within IoC programs. Our research method and change management strategy will address the recommendation to train educators and managers for proper AI tool utilization.

The RPA technology functions as a practical AI-driven tool for administrative automation through its ability to automate repetitive rule-based tasks. Bhardwaj and Kumar (2025) conducted a systematic review of more than 50 studies (2020–2024) to demonstrate that educational institutions achieve "significant time savings, error reduction, and improved satisfaction for both students and staff" through RPA implementation. Application of RPA has produced streamlined workflows that include admissions processing fee collection library management and student support services. Universities achieved data handling precision along with faster student service delivery through the automation of their processes which brought them operational efficiency gains. University adopted RPA technology to automate daily academic sheet collection and signing which produced better data organization and faster management processes. The RPA system for student attendance tracking and reporting automatically eliminated manual attendance checks and enabled instant administrator updates. Automation process described in these examples matches the requirements of IoC program administration by allowing the automation of attendance tracking and logbooks and reports. Literature shows a rising trend of RPA implementation throughout higher education institutions since Gartner's forecast by Bhardwaj & Kumar states that "40% of educational institutions will implement RPA by 2024" and multiple surveys indicate that most institutions either use RPA or plan to use it soon. Education sector stands to save $2.5 billion annually through RPA efficiency gains which will become possible by 2025.

Positive results from these findings confirm that investing resources in RPA solutions for IoC documentation is both feasible and worthwhile. Both Bhardwaj & Kumar (2025) and Awad and Elsemary (2021) along with other scholars highlight multiple obstacles and challenges which appear during RPA implementation. Implementation of RPA faces two major barriers which include high initial costs and data security concerns about student information exposure alongside essential staff adoption programs. Institutional review by Awad & Elsemary found that automation created concerns about staff training needs and system integration problems and potential job elimination. Literature review conducted by Awad & Elsemary demonstrates that institutions have expressed ethical concerns about the implementation of automation systems because they need to protect student privacy while making transparent automated decisions. This study address security concerns through data protection law compliance and involve stakeholders in the transition process while establishing that the goal is to enhance human work capabilities rather than replace them. Through an examination of RPA success stories and educational implementation challenges we create a stronger base to develop an effective and responsible IoC automation system.

Among other generative artificial intelligence tools, OpenAI's ChatGPT stands out as a significant development since 2022 since it generates human-like text and supports several knowledge functions. Administrators and teachers in the educational field begin testing ChatGPT for producing documentation and content. According to Baig and Yadegaridehkordi's 2024 research, ChatGPT benefits staff members as well as non-academic employees, so serving members of educational communities outside of students. ChatGPT helps staff members automate repetitive writing tasks including email draughting, lesson planning and meeting note summarising, so adding great value. Such skills allow managers to use the system for reflective summary generation, MoU draft creation, and report generation, so saving a great amount of time. By means of a systematic assessment, Dempere et al. (2023) investigated the effects of ChatGPT on higher education institutions and found two main benefits: "automated grading" and "improved student services" via chatbot interfaces. The writers emphasised how artificial intelligence chatbots support administrative tasks including enrolment and advice, so conversational artificial intelligence could support document-based IoC processes. Many educational institutions use artificial intelligence chatbots to create 24/7 virtual assistant services for student questions, so reducing staff burden. Dempere et al. and other experts researchers underline the need of caution since they identify data privacy issues and academic plagiarism concerns together with monitoring needs. Research by Montenegro-Rueda et al. (2023) on the effects of ChatGPT on teaching-learning processes following its introduction revealed that successful implementation of ChatGPT depends critically on teacher familiarity with ChatGPT operations.

The results confirm that in order to apply artificial intelligence technologies like ChatGPT, educational institutions must create appropriate training courses and clear usage rules. According to the literature, Robotic Process Automation

systems such as Microsoft Power Automate and UiPath perform rather well for recording documentation flows. Power Automate allows non-programmers to create automated processes that let the system migrate files, extract form data and send alerts while interacting with Office applications. Although the scholarly literature offers little on Power Automate, RPA case studies help one to deduce its use. Faster and more accurate attendance records were obtained when Gunawan and Wijaya (2023) successfully automated student attendance checking and reporting using an unidentified RPA platform either Power Automate or UiPath. Starting from student sign-in data, the RPA bot shows its capacity to manage a whole process with less human involvement through to final attendance report generation. Suggested approach can automatically run student logbook entries to produce planned progress reports for which industry mentors and teachers can get access. One developing trend in contemporary corporate practices is artificial intelligence integration with RPA. By means of their proposed model which employs AI algorithms to increase RPA's automation sustainability, Patrício et al. (2024) examine the growing union between AI and RPA. By means of content and image analysis, the model suggests that artificial intelligence algorithms should act as decision-makers inside RPA operations.

The project gains from intelligent automation by means of RPA data routing to the IoC database after AI computer vision interpretation of handwritten feedback forms. Studies on intelligent automation reveal that these approaches increase the capacity of automation to manage both simple rule-based chores and challenging cognitive activities. Since AI and RPA technologies are transforming educational management with tools like ChatGPT allowing new documentation and communication solutions, the current literature from 2020 to 2025 shows good support for our initiative. Although earlier IoC studies show the value of IoC, they neglect to investigate automation; hence, our study fills in this knowledge vacuum. Our idea considers the security and training and change management issues that academics have found in line with established implementation benefits (time savings, accuracy improvements, better service). These ideas taken together provide a strong theoretical basis for building an artificial intelligence-driven IoC documentation system at a Malaysian community college.

2. METHODOLOGY

2.1 Research Framework

This concept paper designs, implements, and polishes an AI-driven documentation system for Industry On Campus (IoC) projects using a Design-Based Research (DBR) approach housed inside an action research framework. Four iterative phases of the DBR process guarantee solutions are contextually grounded, user-centered, and practically effective in the real-world environment of a Malaysian community college. Involving IoC coordinators, administrative staff, niche program, students involved in IoC, and industry partners, the study will be carried out at Arau Community College For all data collecting including institutional and student information, ethical approval and informed consent will be obtained.

2.1.1 Phase 1: Systems Design and Needs Analysis

This first phase consists in a thorough requirements study by means of workflow observations, focus groups, and interviews. Researchers will record IoC management's present administrative systems including data collecting, report generation, scheduling, and common bottleneck creation. Particular automation use cases will be found (example, "generate monthly IoC progress report" or "automatically collect student attendance". Consequently, the architecture of the AI-assisted documentation system will be developed. The suggested building consists of:

a. Including student profiles, industry partner details, activity logs, and evaluations, centralized databases relational or cloud-based store IoC data.
b. Robotic Process Automation (RPA) flows let data be extracted from forms or emails and fill databases or trigger planned reports.
c. Natural language processing for summarizing reports and chatbot interfaces for real-time data searches helps to integrate artificial intelligence.
d. Administrators and partners may easily view analytics, summaries, and live updates on a dashboard interface.

By means of prototype reviews and feedback sessions, the system will be co-developed with IoC staff using a user-centered design approach to guarantee relevance and usability. The result is a development guide and system blueprint.

2.1.2 Phase 2: Integration of Development and Artificial Intelligence Tools

This phase uses agile methodology to create iteratively developing cycles. Custom AI scripts will mix tools including Microsoft Power Automate (for automation) and Power BI (for visualization). Examples of sample automations consist:

a. automatically populating SharePoint or SQL databases from IoC activity data extracted from Google Forms.
b. Emails to IoC coordinators from weekly AI-generated summaries created using ChatGPT.
c. Real-time IoC metric querying using AI chatbots (via Power Virtual Agents).

Every component in the system will be tested both functionally and unitally. Data security that is, anonymizing, encryption, user authentication as well as error monitoring will take front stage. Regular sprint reviews will let RPA logic problems or AI misinterpretations be quickly corrected.

2.1.3 Phase 3: Pilot Implementation: One Semester

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One academic semester's worth of pilot cycles will see the system implemented. Staff and coordinators will go through training courses. AI documentation will first run parallel with human techniques to guarantee confidence. Key performance indicators (KPIs) will track system use over the pilot:

a. Time for report generation: artificial intelligence against handcrafted.
b. Count of corrected documentation mistakes.
c. Data update frequency: real-time measurements
d. Industry partners, staff, students and stakeholder satisfaction

Interviews and observations will gather qualitative information to evaluate usability, apparent openness, and confidence in artificial intelligence outputs.

2.1.4 Phase 4: Iterative Refining and Evaluation

Pre- and post-implementation performance will be compared following the pilot in a full evaluation. Mixed methods will be used to examine qualitative comments (user experience, engagement) and quantitative data (time saved, reduced errors):

a. Descriptive statistics covering time, error counts, and report frequency.
b. Thematic coding of user comments (simplicity of use, artificial intelligence credibility).
c. Member-checking of interview summaries guarantees correctness of interpretation.

Feedback will guide system improvement including flow optimization, chatbot enhancements, or quick tuning. A second pilot cycle will assess these gains. Observational logs will record staff adaptation, integration problems, and training efficacy, so augmenting the knowledge base for artificial intelligence application in the field of education.

2.2 Information Verification and Gathering

Transcripts of interviews, survey answers, and system logs constitute data sources. By matching time-tracking data with user-reported workload changes, triangulation will improve validity. Transparency in every system iteration and design choice will help to sustain methodological rigor.

2.3 Scalability and Contributivity

The DBR method guarantees both pragmatic and intellectual results: a validated prototype system for IoC documentation and a set of generally applicable design ideas for using AI tools (ChatGPT, Power Automate) in the management of educational programs. Combining technical innovation with user feedback and action research guarantees that the resulting system is scalable, flexible, and powerful in practical learning environments.

3. EXPECTED OUTCOMES AND IMPACT

It is expected that the suggested AI-assisted documentation system would produce several significant results in line with the declared goals. These expected results are arranged according to every goal stated in Section 1.2:

3.1 Improve Administrative Effectiveness

Supported by similar automation case studies in education, the system is expected to cut staff time spent on IoC documentation chores by 30–50%. AI will handle repetitive tasks including report writing, attendance compiling, and spreadsheet updates so coordinators may concentrate on high-value projects including industry involvement and student mentoring. Validation of these efficiency increases will come from staff interviews and time-tracking logs.

3.2 Help to Lower Mistakes in Ioc Record-Keeping

Human mistake including missing data, computation errors, and inconsistent reporting will be reduced by collecting data once via digital forms and automating downstream processing. AI validation guidelines will guarantee completion of all fields and identification of anomalies, so enhancing data accuracy. Unlike regular changes in the previous manual process, we expect almost zero correction rates in monthly reports.

3.3 Build Dashboards and Automated Reporting Tools

Real-time data processing and on-demand report generating made possible by automation will Up-to- date program performance metrics will show on a live analytics dashboard; weekly or monthly summary reports will be automatically sent to stakeholders. This helps more agile decision-making and quick response on problems or achievements. Evaluation of this capacity will rely on user satisfaction polls and reporting schedules.

3.4 Formal and Professional Documentation

The system will create readable summaries, official letters, and progress updates by using NLP tools including ChatGPT. Industry partners could, for instance, get quarterly AI-generated impact reports, so fostering consistency and professionalism in communication. These tools are supposed to lighten staff workload and raise the caliber of the documentation.

3.5 Increase Stakeholder Involvement

Students will be able to reflect and self-correct by access to auto-generated mid-term summaries of their logged hours and performance. Timeliness and professionalism in updates will help industry partners improve trust and cooperation. The impact of the system on openness and perceived value will be evaluated by means of responses to both groups.

3.6 Support Mydigital And 4IR

Acting as a working prototype for AI-driven education management in line with national policy projects, the system will be Other colleges can copy Arau Community College's approach, so supporting Malaysia's MyDIGITAL Blueprint goals. This will be noted by indicators including knowledge-sharing presentations, benchmarking activities, and interest from other institution or JPPKK. The study will generate a set of design ideas for including artificial intelligence, especially NLP and RPA into the running of educational institutions. Publications and presentations will help to share these ideas: covering iterative testing, quick design, ethical use, and stakeholder involvement. The shift from paper-based to AI-supported IoC management should show the worth of digital transformation in community college governance. These results, taken overall, show both strategic advantages (policy alignment, stakeholder satisfaction, knowledge generation) and direct benefits (efficiency, accuracy, timeliness), so indicating a major progress in the management of IoC programs.

4. CONCLUSION

This concept paper suggested an artificial intelligence-driven documentation system to solve inefficiencies in managing Industry on Campus (IoC) projects within Malaysian community colleges. Built on a design-based research framework, the method combines natural language processing (ChatGPT) and robotic process automation (RPA) to simplify data handling, improve reporting accuracy, and support real-time analytics. 2020–2025 literature confirms that artificial intelligence applications in education greatly lower administrative burden and improve data integrity, Bhardwaj & Kumar; Sposato (2025). While generative AI tools like ChatGPT have shown promise in documentation and stakeholder communication, RPA has shown effective in automating repetitive educational tasks, Toma; Montenegro-Rueda et al. (2023). Improved administrative efficiency, lower human error, and more stakeholder transparency—all of which directly support Malaysia's MyDIGITAL and 4IR policy goals—contribute directly to Malaysia's expected outcomes (Government of Malaysia, 2021a; 2021b). Although the system is tested inside one company, it offers a scalable model for AI-assisted TVET administration that justifies future development and longitudinal impact analyses. In the end, this study emphasizes that artificial intelligence in education goes beyond teaching and has transforming possibilities in institutional governance and industry cooperation.

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