
Keberkesanan Program Kerjasama Industri Berasaskan Micropengawal Arduino terhadap Pembangunan Pelajar

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Abstrak

Kajian ini bertujuan untuk menilai keberkesanan program kerjasama industri berasaskan mikropengawal Arduino terhadap pembangunan pelajar dari segi prestasi akademik, eksplorasi, personaliti dan keterkaitan industri. Seramai 20 orang pelajar dari Jabatan Kejuruteraan Elektrik, Politeknik Ungku Omar telah dipilih melalui pendekatan pensampelan bertujuan. Pemilihan saiz sampel adalah kecil, ia dianggap mencukupi bagi kajian awal berskala kecil dan membolehkan penilaian awal tentang keberkesanan program dijalankan secara mendalam dan terfokus. Proses pemilihan sampel yang sistematik, bermula daripada promosi program, saringan peserta oleh pensyarah kursus 'Programming Fundamentals', penyenggaraan pendek berdasarkan pengetahuan pengaturcaraan, dan penerimaan akhir berdasarkan minat pelajar. Pelaksanaan bengkel dengan kerjasama pihak industri berasaskan micropengawal aduino memberi latihan daan tunjukajar kepada peserta berkaitan asas arduino dan perkongsian ilmu daripada pihak industri bagi memberikan pendedahan sebenar kepada aplikasi Arduino dalam dunia pekerjaan sebenar. Diakhir bengkel, peserta diminta untuk menjawab refleksi program. Hasil dapatan releksis ini dijadikan soal silidik bagi kajian ini dengan menggunakan reka bentuk kuantitatif dengan instrumen soal selidik berskala Likert empat mata bagi menilai persepsi pelajar mengikut objektif kajian iaitu menilai persepsi pelajar terhadap keberkesanan program kerjasama industri berasaskan Arduino, mengenal pasti perbezaan persepsi pelajar berdasarkan jantina terhadap keberkesanan program kerjasama industri berasaskan Arduino, menentukan hubungan antara penerokaan teknologi, personality dan keterkaitan industri dengan prestasi akademik pelajar dan menganalisis kesan bersama penerokaan, personaliti dan keterkaitan industri terhadap prestasi akademik pelajar melalui analisis regresi. Analisis statistik dilaksanakan melibatkan ujian-t sampel bebas, korelasi Pearson dan regresi linear berganda. Analisis deskriptif menunjukkan semua pembolehubah mencatat skor min yang tinggi, mencerminkan persepsi positif pelajar terhadap keberkesanan program. Ujian-t menunjukkan tiada perbezaan signifikan antara pelajar lelaki dan perempuan, manakala analisis korelasi mendapati terdapat hubungan positif yang signifikan antara eksplorasi, personaliti dan keterkaitan industri dengan prestasi akademik. Walaupun model regresi secara keseluruhan adalah signifikan ($F = 9.935$, $p = 0.001$; $R^2 = 0.651$), tiada pembolehubah bebas individu yang signifikan secara statistik. Kajian ini menyimpulkan bahawa program berasaskan Arduino mempunyai potensi untuk menyumbang kepada pembangunan pelajar secara holistik, namun kesan langsung terhadap prestasi akademik mungkin turut dipengaruhi oleh faktor luaran lain yang tidak dinilai dalam kajian ini dimana penyertaan pelajar perlu diperbanyakkan bagi meningkatkan kebolegunaan hasil kajian serta memperkukuh kesahan kajian

Katakunci : Arduino; pembangunan pelajar; kerjasama industri; prestasi akademik; pendidikan teknikal

This study aims to evaluate the effectiveness of the Arduino microcontroller-based industrial collaboration program on student development in terms of academic performance, exploration, personality and industrial relevance. A total of 20 students from the Department of Electrical Engineering, Ungku Omar Polytechnic, were selected through a purposive sampling approach. Where the sample size selection was small, it was considered sufficient for a small-scale initial study and allowed for an initial assessment of the program's effectiveness to be conducted in depth and focused.. A systematic sample selection process starts with program promotion, screening of participants by the 'Programming Fundamentals' course lecturer, shortlisting based on programming

knowledge, and final acceptance based on student interest. The workshop implementation in collaboration with the Arduino microcontroller-based industry provided training and guidance to participants on the basics of Arduino and knowledge sharing from the industry to provide real exposure to Arduino applications in the real world of work. At the end of the workshop, participants were asked to answer a reflection on the program. The results of this reflection were used as a questionnaire for this study using a quantitative design with a four-point Likert scale questionnaire instrument to assess student perceptions according to the study objectives, namely to determine student perceptions of the effectiveness of the Arduino-based industry collaboration program, identify differences in student perceptions based on gender of the efficacy of the Arduino-based industry collaboration program, determine the relationship between technological exploration, personality and industry relevance with student academic performance, and analyze the joint effects of exploration, personality and industry relevance on student academic performance through regression analysis. Statistical analysis involved an independent sample t-test, Pearson correlation, and multiple linear regression. Descriptive analysis showed that all variables recorded high mean scores, reflecting students' positive perceptions of the effectiveness of this program. The t-test showed no significant difference between male and female students, and correlation analysis found a significant positive relationship between exploration, personality, and industry relevance with academic performance. Although the overall regression model was significant ($F = 9.935$, $p = 0.001$; $R^2 = 0.651$), no individual independent variables were statistically significant. This study concludes that Arduino-based programs have the potential to contribute to student development holistically, however, the direct impact on academic performance may also be influenced by other external factors that were not assessed in this study, where student participation needs to be increased to increase the applicability of the study results and strengthen the validity of the study.

Katakunci : *Arduino; student development; industry collaboration; academic performance; technical education*
