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Career-Ready Hub: Developing an AI-Based Recruitment Simulation Bootcamp to Enhance Vocational Students' Work Readiness

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Abstrak

Penelitian ini bertujuan mengembangkan model bootcamp Career-Ready Hub berbasis platform simulasi rekrutmen terintegrasi guna mengakselerasi kesiapan kerja siswa kelas XII SMK PGRI 2 Pasuruan. Tingkat pengangguran terbuka lulusan SMK sebesar 8,62% (BPS, 2024) dan rendahnya serapan kerja sesuai bidang (41,3%) menjadi latar belakang urgensi penelitian. Metode yang digunakan adalah Research and Development (R&D) model ADDIE-DBR. Analisis kebutuhan dilakukan terhadap 80 siswa kelas XII dan manajer HRD industri. Validasi produk melibatkan validator ahli (rerata 87,3%; Sangat Valid). Uji efektivitas menggunakan desain quasi-eksperimen Nonequivalent Control Group dengan sampel 124 siswa (n=62 eksperimen; n=62 kontrol). Instrumen pengukuran menggunakan Career Readiness Assessment Tool (CRAT) yang terdiri dari 60 item pada 6 dimensi (alpha=0,889). Hasil menunjukkan perbedaan yang sangat signifikan antara kelompok eksperimen (M_gain=23,73) dan kontrol (M_gain=8,06) (t(122)=22,46; p<.001; d=5,72). Analisis MANOVA mengkonfirmasi efektivitas pada seluruh enam dimensi kesiapan kerja (F(6,117)=89,43; p<.001; eta2=0,815). Career-Ready Hub terbukti efektif dan praktis sebagai inovasi model bootcamp kesiapan kerja bagi pendidikan vokasional.

Kata Kunci: *Bootcamp; Kesiapan Kerja; Model Pembelajaran; Pendidikan Vokasional; Simulasi Rekrutmen.*

Abstract

This study aims to develop the Career-Ready Hub bootcamp model based on an integrated recruitment simulation platform to accelerate work readiness of grade XII students at SMK PGRI 2 Pasuruan. The open unemployment rate of SMK graduates at 8.62% (BPS, 2024) and low field-relevant employment absorption (41.3%) constitute the research background. Research and Development (R&D) using the ADDIE-DBR model was employed. Needs analysis was conducted on 80 grade XII students and 8 industry HRD managers. Product validation involved 5 expert validators (mean 87.3%; Very Valid). Effectiveness testing applied a quasi-experimental Nonequivalent Control Group design with 124 students (n=62 experimental; n=62 control). The Career Readiness Assessment Tool (CRAT) comprising 60 items across 6 dimensions (alpha=.889) served as the measurement instrument. Results indicate a

highly significant difference between experimental (M_gain=23.73) and control (M_gain=8.06) groups (t(122)=22.46; p<.001; d=5.72). MANOVA confirms effectiveness across all six work readiness dimensions (F(6,117)=89.43; p<.001; eta2=.815). Career-Ready Hub is proven effective and practical as an innovative work readiness bootcamp model for vocational education.

Keywords: *Bootcamp; Recruitment Simulation; Vocational Education; Work Readiness; Learning Model.*

INTRODUCTION

Vocational education in Indonesia continues to face challenges in preparing graduates for successful transitions into the labour market. Vocational high schools (*Sekolah Menengah Kejuruan* [SMK]) are mandated to prepare students for employment and the development of work-related competencies (Undang-Undang Republik Indonesia Nomor 20 Tahun 2003, 2003). However, SMK graduates have the highest open unemployment rate among graduates across educational levels, reaching 8.62% in February 2024 (Badan Pusat Statistik [BPS], 2024). This situation may indicate a persistent gap between the competencies developed through vocational education and those demanded by the contemporary labour market (Ridwan & Dwiyanti, 2024), particularly in terms of graduates' readiness to navigate increasingly complex recruitment and employment processes. Employability, therefore, extends beyond technical competence and is also shaped by individual attributes, including academic achievement and self-concept (Tentama & Abdillah, 2019).

Work Work readiness is a multidimensional construct that extends beyond the possession of technical skills. It encompasses individuals' capacity to navigate recruitment procedures, psychological preparedness for career development, clarity of vocational identity, and the ability to apply digital tools in professional contexts (Tomlinson, 2012; van Laar et al., 2017). Evidence from Indonesian vocational high schools suggests that psychological and learning-related attributes, including self-regulation and learning agility, are associated with work readiness (Jari & Satwika, 2025; Tentama & Riskiyana, 2020). Consistent with these concerns, a preliminary study conducted at SMK PGRI 2 Pasuruan identified several gaps in students' preparation for the transition to employment. Specifically, 76.4% of Grade XII students had never participated in a structured mock interview, 82.1% reported limited understanding of contemporary recruitment procedures, and only 41.3% of graduates obtained employment aligned with their field of study within six months of graduation.

Various interventions have been developed to strengthen the work readiness of vocational students. These include work-based learning models explicitly oriented toward work readiness (Sudarsono, 2022), approaches aimed at strengthening career adaptability (Lakshmi & Elmartha, 2022), and interventions targeting work motivation, interpersonal skills, and knowledge construction (Indrawati et al., 2023). Related research has also examined decision-making self-efficacy and career exploration in relation to work readiness among engineering students (Makki et al., 2023). However, these approaches have generally addressed specific dimensions of work readiness rather than integrating multiple recruitment-related competencies into a single, intensive intervention. In particular, the integration of AI-supported recruitment simulation within a structured bootcamp format for vocational high school students remains underexplored.

Bootcamp-based training offers an intensive and practice-oriented format that may be particularly relevant to work-readiness development. However, empirical evidence

concerning its application among school-age vocational learners remains limited. A recent Indonesian study involving Generation Z participants found that online bootcamp training was positively associated with work readiness, with self-efficacy partially mediating this relationship (Efendi, 2025). Meanwhile, AI-supported interview technologies have been examined in recruitment settings, including research on the effects of synchrony and artificial intelligence in video interviews on interview ratings and applicant attitudes (Suen et al., 2019). In educational contexts, a quasi-experimental study found that students who participated in an AI-guided interview simulation demonstrated higher perceived employability and confidence than those in a no-intervention comparison group, although no significant difference was observed in interview anxiety (Sarıköse et al., 2025). More broadly, simulation-based learning has demonstrated effectiveness in developing complex skills in higher education (Chernikova et al., 2020), while research on AI in education has expanded substantially across learning and assessment contexts (Chen et al., 2020; Zawacki-Richter et al., 2019). Nevertheless, existing evidence has largely examined individual simulation components or higher-education and adult populations rather than a comprehensive, integrated recruitment-readiness intervention for vocational high school students.

To address this gap, the present study developed Career-Ready Hub, an intensive bootcamp model integrating AI-supported recruitment simulations to strengthen the work readiness of Grade XII SMK students. The model comprises five digitally mediated simulation modules: CV/resume preparation, adaptive psychometric testing, AI-powered interview simulation, technical competency assessment, and assessment-centre simulation. The study aims to (1) analyse the work readiness gap among students at SMK PGRI 2 Pasuruan; (2) develop and validate the Career-Ready Hub model; (3) assess its practical usability; and (4) evaluate its effectiveness in improving students' work readiness.

The novelty of Career-Ready Hub lies not in any individual component but in the integration of multiple recruitment-related simulations within a single, intensive intervention. Existing bootcamp research on work readiness has predominantly involved adult or Generation Z participants rather than vocational high school students (Efendi, 2025), while studies of AI-based interview simulation have largely focused on higher-education or applicant populations and have typically addressed interview practice as an individual skill (Sarıköse et al., 2025; Suen et al., 2019; Zhang et al., 2026). Career-Ready Hub extends this body of research by integrating five digitally mediated simulation modules into a structured seven-day bootcamp and evaluating the intervention through a controlled quasi-experimental design using a validated multidimensional instrument (CRAT).

METHOD

This study adopted a Research and Development (R&D) approach using the hybrid ADDIE-DBR model (Analysis, Design, Development, Implementation, Evaluation - Design-Based Research), following established ADDIE and DBR guidance (Anderson & Shattuck, 2012; Branch, 2009; Spatioti et al., 2022). Rather than treating ADDIE and DBR as separate frameworks, this study embedded a DBR micro-cycle of design, test, and revise within each ADDIE phase. In the Analysis phase, initial needs-survey findings were cross-checked with HRD manager interviews before the platform content scope was finalised. In the Design and Development phases, three successive prototype iterations were produced, each revised on the basis of expert-validator feedback and observations from individual and small-group trials before advancing to the next iteration. In the Implementation phase, formative evaluation data collected after the individual trial (n = 6) and the small-group trial (n = 18) were used to

revise the platform's interface, scenario content, and time allocation prior to the full field trial (n = 124). This phase-embedded cycling of field evidence into product revision is what distinguishes the ADDIE-DBR integration used here from a standard linear ADDIE procedure.

Setting and Participants

The study was conducted at SMK PGRI 2 Pasuruan, East Java, during the Even Semester of the 2025/2026 Academic Year. The research subjects were Grade XII students from three areas of specialization: Mechanical Engineering (TPM), Visual Communication Design (DKV), and Office Management (MP). The effectiveness test sample was determined through purposive sampling, comprising 124 students divided into an experimental group (n = 62) and a control group (n = 62) using a Nonequivalent Control Group Design.

Table 1. Research Sample Characteristics

Area of Specialization	Experimental (n)	Control (n)
TPM	21	21
DKV	21	21
MP	20	20
Total	62	62

Instrumentation

The primary research instrument was the Career Readiness Assessment Tool (CRAT), a five-point Likert scale developed to measure six dimensions of work readiness: (1) Knowledge of the World of Work (10 items); (2) Recruitment Skills (12 items); (3) Self-Presentation Competence (10 items); (4) Career Psychological Maturity (10 items); (5) Vocational Identity (8 items); and (6) Professional Digital Literacy (10 items). The instrument comprised a total of 60 items with a maximum score of 300. Content validity was established via the Content Validity Index (CVI = 0.91; Lynn, 1986), as rated by five subject-matter experts. Overall scale reliability was confirmed through Cronbach's alpha (α = .889), with Confirmatory Factor Analysis (CFA) yielding acceptable fit indices (CFI = 0.94; RMSEA = 0.052), judged against the criteria of Hu & Bentler (1999).

Development Procedure

The Career-Ready Hub model was developed through five sequential ADDIE-DBR phases. The Analysis phase (February-March 2026) involved a needs survey with 80 students and in-depth interviews with HRD managers. The Design phase (March-April 2026) produced the model's architectural blueprint and the platform's digital wireframe. The Development phase (May 2026) yielded a validated prototype evaluated by expert validators. The Implementation phase proceeded through three stages of field testing: individual trials (n = 6), small-group trials (n = 18), and a full field trial (n = 124). The Evaluation phase was conducted formatively at each implementation stage and summatively upon completion of the field trial.

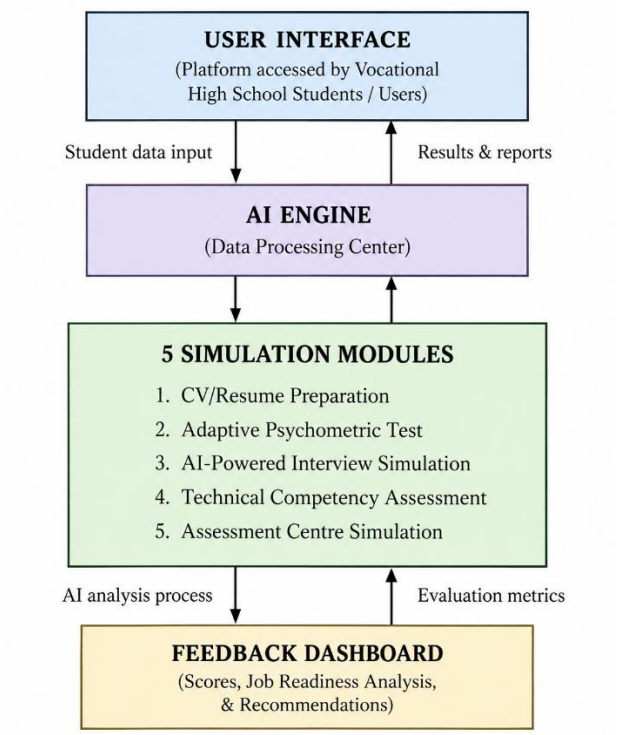


Figure 1. Career-Ready Hub System Architecture/Workflow Diagram

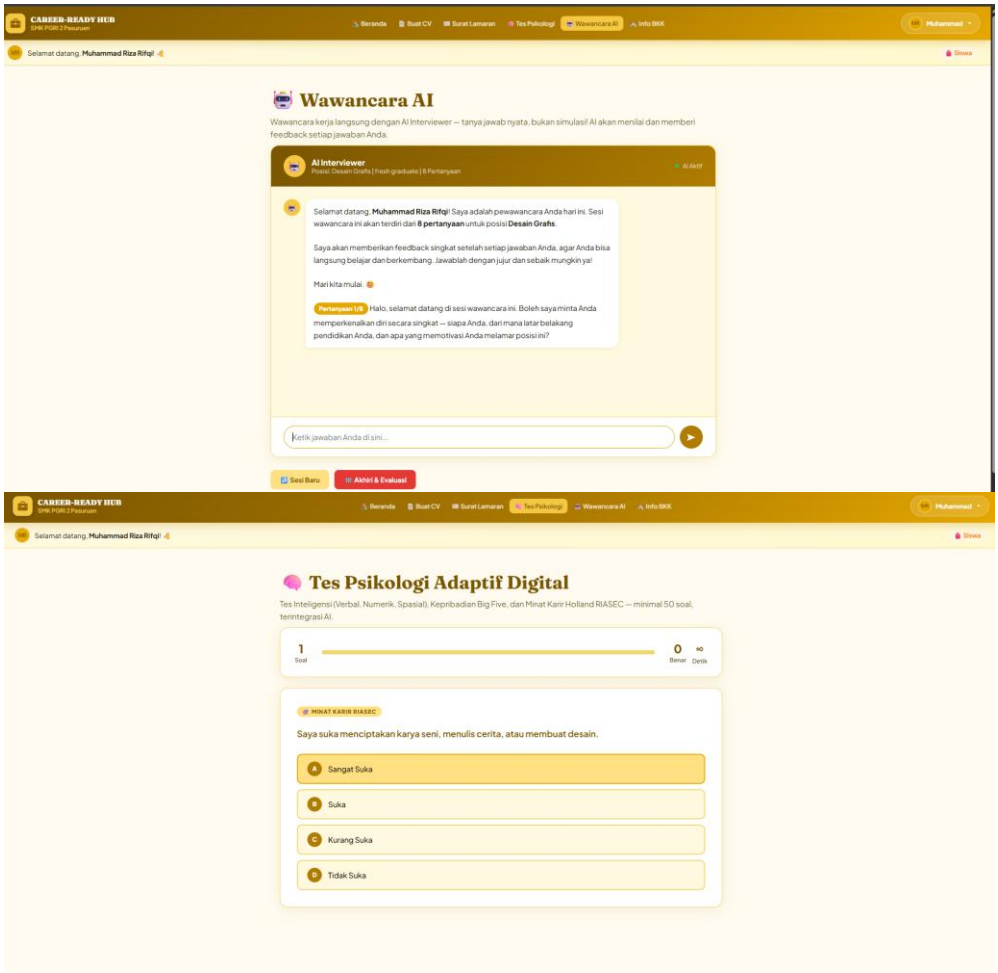


Figure 2. Representative Interface Screenshots of at Least Two Modules (e.g., The AI Interview Simulation and The Psychometric Testing Module)

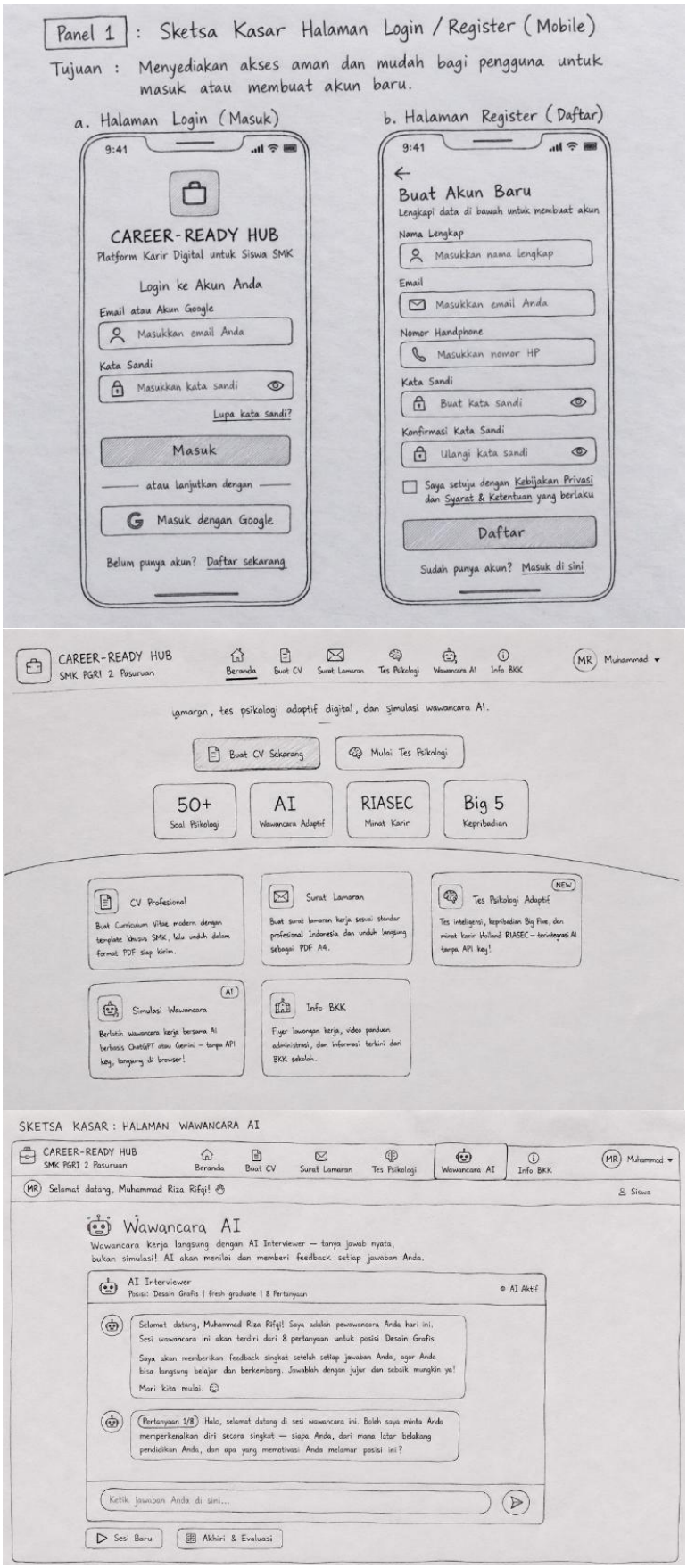


Figure 3. Storyboard Excerpt from the Initial Design Phase, Illustrating User Flow

Data Analysis

Data were analysed using IBM SPSS Statistics Version 27 and R Studio 4.3.1. The Shapiro-Wilk test was used to assess normality, and Levene's Test was applied to evaluate homogeneity of variance. The primary hypothesis was tested using an Independent Samples t-test comparing the gain scores of both groups, with effect size quantified using Cohen's d. Multivariate Analysis of Variance (MANOVA) was employed to examine group differences across all six CRAT dimensions simultaneously. Improvement in work readiness was quantified using Hake's normalised gain (N-gain) (Hake, 1998).

RESULTS

Need Analysis

Survey results revealed substantial work readiness deficits among grade XII students at SMK PGRI 2 Pasuruan. The most pronounced gaps were identified in the following areas: readiness for psychological testing (91.2%), ability to produce Applicant Tracking System (ATS)-compatible CVs (84.6%), understanding of contemporary recruitment procedures (82.1%), and self-presentation confidence (76.3%). All HRD managers consulted during the interviews concurred that inadequate preparation for the recruitment process rather than deficient technical competencies was the primary factor underlying the repeated rejection of SMK graduate candidates.

Validity and Practicality

Assessment by the five expert validators produced an overall mean validity score of 87.3%, classified as Very Valid. The highest score was recorded for content relevance to industry requirements (91.4%), while the lowest was assigned to the functionality of AI-driven features (85.2%). Practicality was evaluated by eight teachers/facilitators and 62 students, yielding an overall mean practicality score of 86.9% (Very Practical). The digital platform's visual appeal received the highest sub-score (91.4%), while the appropriateness of the time allocation received the lowest (82.5%).

Prerequisite Tests

All statistical assumptions were satisfied prior to hypothesis testing. Pre-test and post-test data for both groups were normally distributed as confirmed by the Shapiro-Wilk test (all $p > .05$). Variance homogeneity was also established (Levene's $F = 1.234$, $p = .269$). No statistically significant difference was found between the pre-test scores of the experimental and control groups ($t(122) = 0.388$, $p = .699$, $d = 0.069$), confirming initial group equivalence.

Descriptive Statistics

Table 1. Descriptive Statistics of CRAT Scores for Both Groups

Statistic	Pre-Exp.	Post-Exp.	Pre-Con.	Post-Con.
M	58.43	82.16	57.86	65.92
SD	8.21	7.34	8.64	7.89
Gain (M)	—	23.73	—	8.06
N-Gain	—	0.572	—	0.191

Note. Exp. = Experimental; Con. = Control; CRAT scores range from 0 to 100; n = 62 per group.

Hypothesis Testing

The Independent Samples t-test revealed a highly significant difference in mean gain scores between the experimental group (M = 23.73, SD = 5.42) and the control group (M = 8.06, SD = 4.18; t(122) = 22.46, p < .001). Cohen's d of 5.72 indicated a massive effect size, far exceeding the threshold for a 'large' effect (d ≥ 0.80) established a priori. The N-gain value of the experimental group (0.572) falls within the moderate-to-high category, while the control group's N-gain (0.191) is classified as low.[A5.1]

MANOVA results indicated a highly significant multivariate group difference (F(6,117) = 89.43, p < .001; Wilks' Λ = 0.185; η^2 = .815). Univariate follow-up tests confirmed significant differences on each of the six CRAT dimensions individually (all p < .001), with partial η^2 values ranging from .601 for Knowledge of the World of Work to .733 for Professional Digital Literacy. The multivariate η^2 value of .815 indicates that 81.5% of the total variance in work readiness outcomes can be attributed to participation in the Career-Ready Hub intervention.

DISCUSSION

The findings provide empirical support for the primary hypothesis that the Career-Ready Hub bootcamp was associated with substantially greater improvements in work readiness among SMK students than the conventional preparatory programme. The observed effect size was exceptionally large (Cohen's d = 5.72), considerably exceeding the benchmark of d = 0.40 reported by Hattie (2009) for educational interventions. However, the magnitude of this effect should be interpreted cautiously and in relation to the characteristics of the present study rather than as evidence that the Career-Ready Hub model will produce similarly large effects across settings.

Several complementary learning mechanisms may help explain the observed improvement. First, the intervention incorporated structured and targeted deliberate practice that directly addressed identified gaps in work readiness competencies, consistent with principles of expert skill development (Ericsson et al., 1993). Second, the use of authentic recruitment simulations provided opportunities for students to practise skills in contexts resembling actual employment processes. This feature is consistent with experiential learning principles (Kolb, 2014) and with the concept of authenticity in assessment and learning proposed by Gulikers et al. (2004). In the present study, these principles were extended into a framework termed Triple Authenticity, defined as the alignment of task authenticity, feedback authenticity, and contextual or social authenticity. Third, immediate formative feedback from the AI supported platform enabled students to identify errors and adjust their performance during repeated practice, consistent with established perspectives on effective feedback (Hattie & Timperley, 2007) and self regulated learning (Bandura, 1991). This mechanism is also relevant to evidence identifying self regulation as an important correlate of work readiness among vocational high school students (Tentama & Riskiyana, 2020). Fourth, the intensive bootcamp environment provided opportunities for peer interaction and repeated practice, which may have reinforced engagement and motivation. Because these mechanisms were delivered simultaneously, however, the present design does not permit their individual contributions to be disentangled.

The MANOVA results further indicate that the intervention was associated with substantial improvements across the six dimensions of work readiness, with a multivariate η^2 of .815. Professional Digital Literacy demonstrated the largest partial η^2 (.733), suggesting particularly strong improvement in students' digital competence for professional contexts. This finding is theoretically consistent with the growing importance of digital skills as part of 21st century

competencies (van Laar et al., 2017). Nevertheless, the large dimension specific effect should also be interpreted in light of the intervention content. Because students repeatedly interacted with a digitally mediated recruitment platform, the particularly large gain in Professional Digital Literacy may partly reflect the close correspondence between the learning activities and the assessed construct.

The exceptionally large effect size (d = 5.72) also warrants methodological consideration. Several characteristics of the study may have contributed to the magnitude of the observed effect. First, the control group received a conventional preparatory programme of substantially lower intensity, creating a relatively large contrast between the experimental and comparison conditions. Second, the CRAT items closely reflected activities practised during the bootcamp, including ATS oriented CV preparation and mock psychometric testing. Consequently, part of the observed gain may reflect intervention measurement alignment rather than a fully generalised improvement in work readiness. Third, the short pre post interval and relatively homogeneous sample from a single school and three specialisations may have limited within group variability and contributed to a large standardised effect. Fourth, expectancy or Hawthorne effects cannot be ruled out, particularly because participants in the intervention condition received an intensive and novel programme (McCambridge et al., 2014). Potential assessor and self report bias also warrants consideration where members of the intervention team were involved in aspects of evaluation. Fifth, the intervention dose, consisting of seven days at eight hours per day, was substantially greater than that of many conventional preparatory programmes. The magnitude of the effect may therefore reflect not only the specific Career-Ready Hub design but also the intensity of exposure. For comparison, Chernikova et al. (2020) reported a mean effect of g = 0.85 across 145 studies of simulation based learning in higher education. Kraft (2020) likewise cautions against interpreting educational effect sizes independently of study design, implementation characteristics, cost, and scalability. Taken together, these considerations suggest that d = 5.72 should be regarded as an effect estimate specific to the conditions of the present study rather than as a general parameter of Career-Ready Hub effectiveness. Future studies should therefore employ active control conditions, larger and more diverse samples, delayed post tests, and outcome measures that are less directly aligned with the intervention content. A randomised controlled trial would provide stronger evidence regarding the causal effect of the model.

The direction of the findings is broadly consistent with previous research on AI supported interview preparation, although the populations, outcomes, and intervention scope differ. Sarıköse et al. (2025), for example, found that final year nursing and midwifery students who participated in an AI guided interview simulation reported higher perceived employability and confidence than students in a no intervention comparison group, whereas interview anxiety did not differ significantly. Both studies therefore provide evidence that AI supported simulation may contribute to perceived readiness for employment related tasks. The present study extends this literature by examining secondary vocational students, integrating five recruitment related simulation modules within a seven day bootcamp, and assessing multiple dimensions of work readiness rather than perceived employability alone. Similarly, Zhang et al. (2026) reported that AI based mock interviews were indirectly associated with employability through self efficacy and reflective practice among undergraduate students. This finding is compatible with the proposed roles of feedback, reflection, and self regulation in the present intervention. However, because the current study did not examine mediating variables, the two findings should not be interpreted as establishing the same mechanism.

Future research could therefore examine whether self efficacy and reflective practice mediate the relationship between participation in Career-Ready Hub and work readiness outcomes.

The findings are also broadly consistent with Indonesian research concerning psychological and learning related factors associated with work readiness. Tentama & Riskiyana (2020) found that self regulation and social support were associated with work readiness among vocational high school students, with self regulation emerging as the stronger predictor. Jari & Satwika (2025), meanwhile, reported that learning agility predicted work readiness among office management students, whereas perceived social support did not demonstrate the same predictive role. These findings provide a useful qualification to the proposed role of the bootcamp community. Although peer interaction and social learning may contribute to engagement, the present design cannot establish that the social component independently produced the observed gains. Other studies have examined work motivation, interpersonal skills, and knowledge construction (Indrawati et al., 2023) and career adaptability (Lakshmi & Elmartha, 2022) in relation to work readiness. Several of these constructs conceptually overlap with dimensions assessed by the CRAT, including Knowledge of the World of Work, Self Presentation Competence, and Career Psychological Maturity. Such conceptual correspondence may help explain the multidimensional pattern of improvement observed in the present study. Compared with the questionnaire based study of Generation Z bootcamp participants by Efendi (2025), the present study provides evidence from school age vocational learners using a quasi experimental design. However, the absence of follow up measurement means that the durability of these gains remains unknown.

The study also offers a theoretical contribution by proposing Triple Authenticity as a design framework for vocational learning simulations. Rather than treating authenticity as a single property of a learning task, the framework in this study emphasises the simultaneous alignment of task authenticity, feedback authenticity, and contextual or social authenticity. This formulation draws on the broader dimensions of authenticity identified by Gulikers et al. (2004) while adapting them to digitally mediated recruitment simulations. However, the evidence presented here does not by itself establish Triple Authenticity as a validated theoretical construct. Its contribution should therefore be understood as a theoretically informed design proposition that requires further conceptual development and empirical testing. Future research should operationalise each dimension independently and examine whether variation in these dimensions predicts learning and work readiness outcomes. This would allow the proposed framework to move beyond a descriptive design principle toward a testable explanatory model.

The findings also have implications for instructional design and vocational education policy. From an instructional design perspective, the results suggest that the educational value of AI may depend less on technological sophistication alone than on how technology is embedded within authentic learning activities, feedback processes, and opportunities for practice. A technically sophisticated AI system may therefore be less effective than a simpler system if the underlying learning design does not provide meaningful task and feedback authenticity. At the same time, the intensive delivery format creates an important scalability challenge. The effectiveness observed in this study may be partly attributable to the seven day, eight hours per day intervention dose, which may be difficult to reproduce within the timetable and resource constraints of ordinary SMK settings. Consequently, scaling Career-Ready Hub into a distributed or lower intensity format should be treated as an empirical question rather than an assumption.

From a policy perspective, the findings support further experimentation with integrated recruitment preparation programmes in vocational education but do not justify immediate system wide adoption. The single school sample, short follow up period, intensive intervention dose, and quasi experimental design limit the generalisability of the findings. Consistent with the principle of trialability in diffusion of innovations (Rogers, 2003), subsequent implementation should involve schools with different geographical, institutional, and student characteristics. Such studies would help identify the boundary conditions under which Career-Ready Hub is effective, the minimum intervention dose required to maintain meaningful gains, and the extent to which improvements in measured work readiness translate into actual employment outcomes.

CONCLUSION

The Career-Ready Hub bootcamp model, built upon an integrated recruitment simulation platform, demonstrated high content validity (87.3%), practical applicability (86.9%), and a large effect on work readiness among Grade XII students at SMK PGRI 2 Pasuruan ($t(122) = 22.46$, $p < .001$, $d = 5.72$; MANOVA $\eta^2 = .815$). The model integrates the Triple Authenticity principle with AI-supported recruitment simulations, adaptive feedback mechanisms, and an intensive bootcamp format designed to provide an immersive and practice-oriented learning environment. These features may contribute to the substantial improvement in work readiness observed in the present study. However, given the single-school quasi-experimental design, the findings should be interpreted as promising evidence of effectiveness under the conditions of this study rather than as definitive evidence of generalisable effectiveness across SMK settings.

The practical implications of the findings are therefore best framed as directions for further piloting rather than immediate system-wide adoption. First, SMK PGRI 2 Pasuruan and schools with comparable characteristics may consider piloting Career-Ready Hub as an elective or supplementary work readiness programme for Grade XII students while further evidence is accumulated. Second, provincial education authorities should consider multi-site pilot studies before making broader implementation decisions, particularly to determine whether the observed effects are sustained across schools with different institutional, geographical, and student characteristics. Third, vocational EdTech developers may use the platform architecture and simulation components as a reference for further product development, subject to independent validation and usability testing. Future research should prioritise randomised controlled trials with active control conditions, longitudinal designs examining whether improvements in work readiness translate into more successful labour market transitions, and replication studies involving diverse SMK institutions. Such research would provide stronger evidence regarding the model's causal effects, sustainability, scalability, and transferability before wider implementation is considered.

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