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# Readiness of prospective elementary school teachers for project-based hybrid learning in social studies course

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**Abstract:** The effectiveness of PjBHL is measured in terms of dimensions such as motivation, prospective behavior, self-regulated learning, and ICT literacy both online and offline. The research aims to assess the preparedness of elementary teacher education students before engaging in social studies using the PjBHL model. Conducted in June 2025, this quantitative study involved 117 students (56 males and 61 females) from the Primary School Teacher Education Program at Universitas PGRI Kanjuruhan Malang. A Likert-scale questionnaire (1-4) was employed to evaluate student readiness in motivation, prospective behavior, self-regulation, and ICT proficiency. Descriptive statistics were used to analyze readiness levels, and MANOVA was applied to compare gender differences. The findings indicate that 1) students' readiness for PjBHL was relatively good, rated as B+, and 2) motivation, prospective behavior, self-regulated learning, and ICT skills did not show significant differences based on gender. The study recommends that lecturers adopt adaptive, student-centered pedagogies that facilitate gender-neutral approaches, ensuring equitable learning opportunities for all students.

***Keywords:*** *ICT Skills, Motivation, Project-based Hybrid Learning (PjBHL), Prospective behavior, Self-regulated Learning.*

## 1. Introduction

Project-based Learning (PjBL) is also the most well-received active learning method of fostering student creativity. It organizes learning according to actual, real projects in which students actively engage in problem-solving and practical tasks [1, 2]. Extends far beyond the transmission of critical knowledge and basic principles; it encourages independent learning and yields concrete, real-world products [3-5]. The strategy is designed to link course material to everyday surroundings, developing organizational abilities, enhancing group work, encouraging inquiry-based learning, and enhancing critical thinking in order to solve problems [6].

PjBL is also effective in its capacity to elicit multiple modes of intelligence, rendering learning more contextualized and engaging [7]. The model serves as a vital intervening link between learning in class and learning in real-life contexts, encouraging better student interest and motivation towards learning [8, 9]. PjBL practice generates profound educational benefits: (1) enhanced motivation by real project work tasks; (2) training of inventive ability and problem-sensitizing ability; (3) co-learning through cooperative group work; and (4) transfer of scientific values like prudence, ethical behavior, reliability, and innovative thinking [10-13]. Empirical evidence illustrates that the multi-faceted gains of PjBL facilitated the promotion of creativity among students to a great extent, thereby being a tested pedagogy for creative competence development [14, 15].


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Project-Based Learning is a twofold pedagogical strategy, promoting creative development while simultaneously supporting the fundamental competencies of 21st-century educational models, specifically the key 4Cs (Critical Thinking, Creativity, Collaboration, and Communication) [16, 17]. In the current interconnected digital age, PjBL prepares students with fundamental competencies –such as digital literacy, analytical thinking, and innovative ability for solving complicated real-world challenges [18]. Genuine project-based learning allows students to attain double results: content knowledge and fundamental competencies in data management, interpersonal communication, and teamwork adaptability needed in contemporary settings [19-21].

When implementing PjBL, teachers promote student agency in collaborative knowledge construction, design activity, and reflection practice competencies present in workforce planning for imaginative problem-solving and self-regulating learning skills [22, 23]. Technology integration in PjBL, through the use of online collaboration software and data analysis, significantly improves the learning quality and cultivates digital literacy. As a model for learning, PjBL nurtures theoretical wisdom, practical skill, and modern social ethics towards fashioning a generation prepared for the intricacies of the future [24]. Though it has numerous pedagogical benefits, PjBL implementation is typically limited to formal traditional face-to-face environments with unsustainably rigid strategies, which can weaken students' interest and inner motivation [25, 26]. The potency of PjBL is compromised when implemented by dull pedagogies since limited interactivity negatively impacts students' willingness to engage deeply with project activities [27, 28]. The potential of PjBL is restricted when delivered by traditional face-to-face models that are characterized by spatial constraints, weakly constructed digital components, and pedantic styles of teaching that discourage active students' participation [29, 30].

The convergence of digitalization and future learning requirements has given rise to project-based hybrid learning (PjBHL), an integrated method that leverages the strength of PjBL with the flexibility and diversity of hybrid learning. Apart from developing necessary future-proof competencies (problem-solving design, innovation, and teamwork), this model especially develops students' capacity for dealing with changing work environments [31-33]. Being an extension of traditional PjBL, project-based hybrid learning integrates physical and virtual learning modes via education technology to enable flexible synchronous and asynchronous teamwork on authentic projects [34]. The novel approach overcomes classical PjBL shortcomings by enabling spatiotemporal flexibility, promoting extended collaboration, and augmenting learning documentation and openness [35, 36]. Online tools like Google Workspace and Zoom form a PjBHL platform that encourages the kind of digital-era skills like virtual collaboration and far-away project coordination while also enabling instructor oversight of learner progress [37, 38].

Recent empirical research attests to the effectiveness of PjBHL in overcoming conventional PjBL constraints. Kurniawan, et al. [39] igned relatively high learner engagement within PjBHL environments compared to conventional deployments. Encouraging research conducted by Kataria, et al. [40] and Steffen, et al. [41] instituted statistically significant growth in intrinsic motivation as a result of blended collaboration modalities. Malyuga and Petrosyan [42] and Mielikäinen [43] also attested to these findings with proof of PjBHL's flexibility to foster critical thinking by means of practical problem-solving scenarios. Bolivar, et al. [44] emphasized the model's accessibility advantage through structured digital resource availability. Furthermore, Pohan and Maulina [45], Tong and Wei [46] and Zakiah and Fajriadi [47] long-term studies indicate that this hybrid project-based approach can improve knowledge retention.

The effectiveness of PjBHL is largely influenced by how prepared students are before engaging in the learning process. This preparation involves: (1) having digital literacy skills to effectively use different hybrid learning platforms; (2) possessing self-discipline in learning to handle independent study; (3) being mentally prepared to adjust to a more adaptable learning approach; and (4) grasping the principles and goals of project-based learning [48-50]. Without adequate readiness in these aspects,

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students may face difficulties in adapting to the dynamics of PjBHL, which demands independence and intensive virtual collaboration.

This research seeks to assess the preparedness of elementary school teacher education students before social studies learning with the use of PjBHL. It is necessary to gain this preparedness to make it easy to implement PjBHL for avoiding foreseen obstacles. The success of PjBHL relies, inter alia, on motivation, latent behavior, self-regulated learning capabilities, and ICT competence online and offline.

## 2. Methods

This study utilized a quantitative method with an exploratory survey-based framework. The participants consisted of 117 students (56 male and 61 female) enrolled in the Primary School Teacher Education Program (Pendidikan Guru Sekolah Dasar/PGSD) at the Faculty of Education, Universitas PGRI Kanjuruhan Malang, Indonesia. These respondents were randomly sampled from a pool of 165 fourth-semester PGSD students enrolled in the Basic Concepts of Social Studies course.

This study employed a questionnaire based on Xiong, et al. [51] to measure the readiness of students toward PjBHL implementation. The questionnaire sought to assess four prominent dimensions of students' readiness, which were motivation, prospective behavior, self-regulated learning, and ICT capability. Motivation was measured through 17 items addressing interest, perception, self-efficacy, and reinforcement. Prospective behavior was measured through 15 items addressing communication, problem-solving, and self-management skills. The self-regulated learning component contained 20 items assessing self-evaluation, organization and transformation, goal setting and planning, and seeking information. ICT skills were measured through 15 items evaluating skills in ICT usage and comfort on ICT usage.

Participants rated each statement on a 4-point Likert scale, with 1 indicating strongly disagree and 4 representing strongly agree. The validity of the instrument was determined via product-moment correlation, and its reliability was assessed using Cronbach's Alpha. Table 1 reveals that all questionnaire items achieved adequate validity and reliability, supporting the tool's effectiveness in measuring the target variables.

**Table 1.**
Results of Instrument Validity and Reliability Test.

| Variable | Indicator | $R_{count}$ | $R_{table}$ | Cronbach's Alpha | Decision |
|---|---|---|---|---|---|
| Motivation | Interest | 0.7685 | 0.294 | 0.968 | Valid & Reliable |
| | Perception | 0.7897 | 0.294 | | Valid & Reliable |
| | Self-efficacy | 0.8292 | 0.294 | | Valid & Reliable |
| | Reinforcement | 0.8667 | 0.294 | | Valid & Reliable |
| Prospective Behavior | Communication | 0.7822 | 0.294 | 0.959 | Valid & Reliable |
| | Problem-solving | 0.8438 | 0.294 | | Valid & Reliable |
| | Self-management | 0.7688 | 0.294 | | Valid & Reliable |
| Self-Regulated Learning | Self-evaluation | 0.8252 | 0.294 | 0.978 | Valid & Reliable |
| | Organization & transforming | 0.844 | 0.294 | | Valid & Reliable |
| | Goal-setting & planning | 0.8848 | 0.294 | | Valid & Reliable |
| | Seeking information | 0.8068 | 0.294 | | Valid & Reliable |
| ICT skills | Skills in ICT usage | 0.7611 | 0.294 | 0.92 | Valid & Reliable |
| | Comfort on ICT usage | 0.6686 | 0.294 | | Valid & Reliable |

The data were collected via Google Forms during June 2025, selected for its efficiency and effectiveness in streamlining the data-gathering process. The study utilized descriptive statistics to analyze the data, calculating means, standard deviations, and score ranges (minimum to maximum) for each variable. Additionally, students' levels of motivation, prospective behavior, self-regulated learning, and ICT skills were classified into categories according to their scores, as detailed in Table 2.

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**Table 2.**
Criteria for Motivation, Prospective Behavior, Self-Regulated Learning, and ICT Skills.

| Score Interval | Alphabetical Score | Numerical Score (Scale 4) | Category |
|---|---|---|---|
| 91 ≤ Score ≤ 100 | A | 4.0 | Very high |
| 84 ≤ Score < 91 | A- | 3.7 | High |
| 77 ≤ Score < 84 | B+ | 3.3 | High |
| 71 ≤ Score < 77 | B | 3.0 | Moderate |
| 66 ≤ Score < 71 | B- | 2.7 | Low |
| 61 ≤ Score < 66 | C+ | 2.3 | Low |
| 55 ≤ Score < 61 | C | 2.0 | Very low |
| 41 ≤ Score < 55 | D | 1.0 | Very low |
| 0 ≤ Score < 41 | E | 0.0 | Very low |

Gender differences across the measured indicators were examined using Multivariate Analysis of Variance (MANOVA). Prior to conducting MANOVA, multivariate normality and equality of covariance matrices were checked for the data to meet statistical assumptions. All the statistical computations were made with IBM SPSS Statistics version 27.

This research investigated possible gender variations in readiness to PjBHL of students through four major variables: motivation, prospective behavior, Self-regulated learning, and ICT competence. The examination was carried out using a hypothesis-testing approach with two rival statistical hypotheses. $H_0$ assumed that there are no gender differences in readiness in any of the four dimensions. $H_1$ predicted that statistically significant gender variations would be detected in one or more of the indicators.

For statistical decision-making, conventional significance thresholds were applied. The analysis would retain the null hypothesis if the obtained significance value (p-value) met or exceeded 0.05, indicating insufficient evidence for gender-based differences. Statistical significance ($p < 0.05$) would warrant rejecting the null hypothesis, supporting the alternative hypothesis of gender variations in readiness measures. This analytical approach allowed for systematic evaluation of potential gender variations in students' preparedness for project-based hybrid learning.

## 3. Result and Discussion

### *3.1. Students' Readiness in PjBHL*

The readiness scores of Primary School Teacher Education Program students in PjBHL are shown in Table 3.

**Table 3.**
Results of Descriptive Analysis on Motivation, Prospective Behavior, Self-Regulated Learning and ICT Skills Score.

| Variable | Indicator | Mean | Category |
|---|---|---|---|
| Motivation | Interest | 81.14 | High |
| | Perception | 80.66 | High |
| | Self-efficacy | 80.13 | High |
| | Reinforcement | 83.07 | High |
| Prospective Behavior | Communication | 81.20 | High |
| | Problem-solving | 80.85 | High |
| | Self-management | 80.13 | High |
| Self-regulated Learning | Self-evaluation | 81.20 | High |
| | Organization and transforming | 80.85 | High |
| | Goal-setting and planning | 80.13 | High |
| | Seeking information | 84.74 | High |
| ICT Skills | Skills in ICT usage | 80.49 | High |
| | Comfort on ICT usage | 82.37 | High |

The analysis of student readiness indicators in PjBHL reveals several important findings (Table 3). Regarding motivation, reinforcement demonstrated the highest average score among indicators, while

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self-efficacy showed the lowest, though all motivation components maintained high overall ratings. For prospective behavior, communication skills scored highest on average, contrasting with self-management which recorded the lowest scores, yet all behavioral aspects remained at high levels. In the domain of self-regulated learning, information-seeking behaviors achieved the highest mean scores, whereas goal-setting and planning showed relatively lower performance, despite all self-regulation indicators being classified as high. The ICT skills assessment indicated that students' comfort with technology surpassed their actual technical competencies, with both dimensions nevertheless falling within the high proficiency range across all measured aspects.

These results collectively demonstrate that while variations exist between specific indicators within each readiness dimension, PjBHL students consistently exhibited high preparedness levels in motivation, prospective behavior, self-regulated learning, and ICT capabilities. The pattern of higher scores in practical application areas (reinforcement, communication, information-seeking, technology comfort) compared to more conceptual or planning-oriented aspects suggests particular strengths in immediate, activity-based competencies.

**Table 4.**
Results of Descriptive Analysis of Student Readiness Scores.

| Variable | N | Minimum | Maximum | Mean | Category |
|---|---|---|---|---|---|
| Motivation | 117 | 44.12 | 98.53 | 81.18 | High |
| Prospective Behavior | 117 | 45.00 | 98.33 | 80.73 | High |
| Self-Regulated Learning | 117 | 53.75 | 98.75 | 81.73 | High |
| ICT Skills | 117 | 50.00 | 100.00 | 81.50 | High |

Table 4 presents the comprehensive readiness assessment results for Primary School Teacher Education Program students participating in PjBHL, showing their performance across all evaluated indicators. The data presented in Table 4 indicate that Primary School Teacher Education Program students demonstrate high readiness levels in all PjBHL implementation variables.

As visualized in Figure 1, a comparative analysis of mean scores reveals that self-regulated learning represents the strongest dimension (81.73), followed closely by other components, with prospective behavior showing the relatively lowest (though still high) average score (80.73). The analysis reveals that Primary School Teacher Education Program students exhibit substantial readiness for PjBHL implementation. This conclusion is supported by the evaluation results, where all readiness indicators consistently achieved a B+ classification according to Universitas PGRI Kanjuruhan Malang's assessment framework. Given these findings, the PjBHL approach appears well-suited for classroom application in elementary education settings with minimal implementation challenges.

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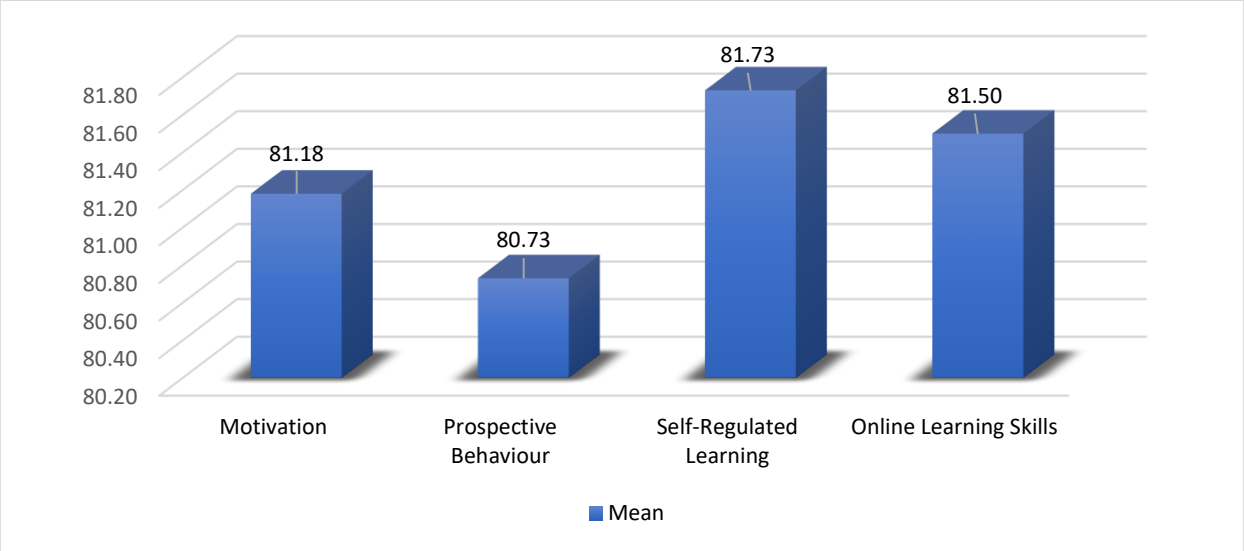


**Figure 1.**
Average Score of Students' Preparedness.

The success of implementing project-based hybrid learning is influenced by two main aspects: active student involvement in self-directed learning and optimal integration of digital technology. This instructional approach integrates both in-person and digital components via organized projects, necessitating students' active engagement in planning and directing their own learning [34, 52]. Therefore, motivation, future behaviour, and self-regulated learning are essential factors, especially if supported by adequate information and communication technology (ICT) competencies [36, 53].

PjBHL encourages self-motivation because students are made accountable for the projects they have worked on and are actively involved in collaboration [37, 54]. The motivation arises from students' confidence that they can accomplish learning goals, and it is an elementary component of independent processes of learning [55]. Students are more likely to stay committed and resilient in accomplishing their projects when they are offered autonomy and personal interest in their learning process.

In addition, PjBHL promotes students' future behavior, i.e. the ability to anticipate, forecast, and prepare for future learning needs [41, 56, 57]. When [students] are confronted with projects that are real-world problems, they learn to design approaches, evaluate probable outcomes, and develop reflective thinking all of which are essential to forward-thinking hybrid learning.

A further strength of PjBHL is that it aligns with characteristics of self-directed learning. The students are guided to set goals, monitor progress, and manage time and affect during learning. These aspects in turn constitute integral components of self-directed learning, which constitute the general base of cultivating students' accountability in their own learning development [40, 44]. Based on this arrangement, the adaptive nature of blended learning allows students to select suitable learning style while encouraging a developmental approach.

Competence in digital literacy is also very important for the effective implementation of PjBHL. The students must be proficient on critical technology tools like LMS systems, virtual conference software, collaboration tools for cloud computing, and computer-based content creation software [38, 58]. The digital competences facilitate smooth transitions among real-time and autonomous learning modes and increase their confidence levels in online platforms and improve their learning motivation [59].

The effectiveness of PjBHL implementation hinges critically on the interplay between technological competencies and learners' psychological preparedness –particularly their academic drive, future-focused mindset, and self-directed learning abilities. This foundation is further reinforced by institutional resources, faculty guidance, and adequate technological provisions, which collectively enhance students'

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ability to navigate project-based requirements. Successful integration of physical and digital learning environments ultimately cultivates transferable competencies essential for contemporary educational and career demands [32, 60].

*3.2. Effect of Different Gender on Students' Readiness in PjBHL*

The normality test outcomes for all measured variables motivation, prospective behavior, self-regulated learning, and ICT competencies are presented in Table 5.

**Table 5.**
Normality Test Result.

| **Correlations** | | | |
|---|---|---|---|
| | | **Mahalanobis Distance** | **Chi_square** |
| Mahalanobis Distance | Pearson Correlation | 1 | 0.796** |
| | Sig. (2-tailed) | | 0.000 |
| | N | 117 | 117 |
| Chi_square | Pearson Correlation | 0.796** | 1 |
| | Sig. (2-tailed) | 0.000 | |
| | N | 117 | 117 |

Table 5 presents the multivariate normality test results, revealing that all measured constructs (motivation, prospective behavior, self-regulated learning, and ICT skills) demonstrate normal distribution, as evidenced by Pearson correlation values $0.796 > r_{table} = 0.1816$. Subsequently, Table 6 displays the homogeneity test outcomes for these same variables.

**Table 6.**
Homogenity Test Result.

| **Box's Test of Equality of Covariance Matrices**[a] | |
|---|---|
| Box's M | 82.852 |
| F | 7.973 |
| df1 | 10 |
| df2 | 62161.333 |
| Sig. | 0.000 |

**Source:** Data Processed (2025).

As shown in Table 6, Box's M test demonstrated statistical significance ($p<0.05$), suggesting the homogeneity of covariance matrices assumption was violated. The comprehensive MANOVA outcomes are documented in Table 7.

**Table 7.**
MANOVA Test Result.

| **Dependent Variable** | **F** | **Sig.** | **Decision** |
|---|---|---|---|
| Motivation | 0.454 | 0.502 | Insignificant |
| Prospective Behavior | 0.354 | 0.553 | Insignificant |
| Self-regulated Learning | 0.000 | 0.992 | Insignificant |
| ICT Skills | 0.014 | 0.906 | Insignificant |

As shown in Table 7, the MANOVA analysis revealed no statistically significant gender differences in any of the four PjBHL readiness dimensions. The analysis of motivation revealed a non-significant result ($p=0.502$), exceeding the established $\alpha=0.05$ threshold. Similarly, prospective behavior showed a p-value of 0.553, demonstrating comparable levels between genders. The self-regulated learning variable revealed an even more pronounced non-significance with $p=0.992$. Finally, ICT skills displayed a p-value of 0.906, again far exceeding the significance cutoff. Across all four variables –motivation, prospective behavior, self-regulated learning, and ICT competencies– the consistently high p-values

(all>0.05) provide robust evidence that male and female students in the PjBHL program demonstrate equivalent readiness levels in these key learning dimensions. The results indicate that students' readiness for project-based hybrid learning appears unaffected by gender considerations.

The research results indicate no significant differences between genders in digital learning. This reflects a paradigm shift in 21st-century education. These findings not only challenge traditional assumptions about gender roles in learning but also expand our understanding of the factors determining academic success in the digital age [61-63]. Learning capacity is shaped by multiple determinants beyond biological sex differences, including cognitive processes, emotional states, sociocultural influences, and environmental conditions. This multidimensional perspective recognizes that gender represents just one potential factor among numerous interrelated elements that collectively influence educational development [64-67].

The fulfillment of core psychological need competence, autonomy, and relatedness serves as a fundamental driver of learning motivation. Recognizing individual variations, including but not limited to gender differences, allows educators to design more inclusive and effective learning experiences. These universal psychological needs transcend gender, applying equally to all learners [68, 69]. In current digital learning, recent research by Zahedi, et al. [70] and Luo, et al. [71] shows that gender-based stereotype threat (social prejudice that can affect performance) in STEM fields is decreasing, as learning methods become more collaborative and project-based. Regardless of gender, students uniformly develop critical thinking competencies through project-based hybrid learning approaches [72-74].

Research indicates that prospective behavior encompassing planning, anticipation, and strategic goal-directed actions does not vary significantly by gender. Empirical evidence suggests self-perceptions of capability and situational learning factors exert greater influence on future planning skills than innate gender differences [75]. Research by Bortes, et al. [76], Ferrar, et al. [77] and Putri and Muttaqin [78] shows that in flexible and participatory project-based hybrid learning, all students have equal opportunities to develop future planning, regardless of gender. This PjBHL model allows students to explore long-term goals, engage in self-reflection, and plan strategies through real-world challenges, thereby fostering prospective behavior through social interaction and meaningful tasks [79].

Research by Shah, et al. [80], Preece and Bullingham [81] and Richardson, et al. [82] demonstrate that self-regulated learning capacities develop primarily through educationally significant experiences and social learning processes, with biological factors like gender showing negligible influence. Digital advancements in education have created supportive learning systems that help all students optimally develop critical thinking skills. These findings support Vygotsky's theory of optimal learning, which states that social interaction and appropriate educational technology support can reduce learning gaps, including those related to gender [83-85].

The notion of "digital natives" reflects evolving insights into how social dynamics and technological engagement intersect in increasingly sophisticated ways, particularly regarding ICT competency development [86]. Equal opportunities in using digital technology have fundamentally transformed technological capabilities [86]. Equal opportunities in using digital technology have fundamentally transformed technological capabilities [87, 88]. The current digital generation is growing up in a technological environment that increasingly reduces gender bias, with digital platforms designed for everyone [89, 90]. This is supported by the ease of access to online knowledge, enabling self-directed learning without gender barriers.

## 4. Conclusion

The study reveals two key findings regarding primary education students' preparedness for project-based hybrid learning. First, participants demonstrated substantial readiness overall, scoring consistently in the B+ range across all assessed dimensions. Second, comprehensive analysis showed no statistically significant gender-based disparities in any measured aspect –including motivational factors,

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prospective behaviors, self-regulation capacities, and digital competencies. These four aspects, which are the main indicators of student learning readiness, are generally in the high category and are not influenced by gender. These findings suggest that PjBHL implementation can adopt a gender-neutral approach, as both male and female students exhibit comparable levels of preparedness across all measured dimensions of learning readiness. These results suggest that instructors should prioritize the development of adaptive, learner-centered pedagogical approaches while offering equitable support to enhance motivation and self-regulation skills irrespective of gender to optimize student success in hybrid learning contexts.

## Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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