Field Study Assessment for Developing 21st-Century Skills

Aris Munandar, Cahyadi Setiawan and Oot Hotimah
Geography Education, Faculty of Social Sciences and Law, Universitas Negeri Jakarta, Rawamangun Muka St., East Jakarta, Jakarta, Indonesia

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Abstract: This research aims to develop and test assessment techniques in field study that can foster 21st-century skills. The research population consisted of all Geography Education students who participated in the field study socio-economic and mapping activities for the class of 2023 at FIS UNJ, totaling 100 students. Purposive sampling was used, resulting in a sample of 31 participants divided into two thematic groups: agriculture and population dynamics. The field study activities took place both on campus and in Sendangsari Village, Gerung District, Wonosobo Regency, Central Java. The series of activities included pre-field study preparations such as committee formation, instrument presentation, and proposal submission. The field study phase involved data collection, data processing, and report drafting. Post-field study activities included presentations in the form of posters and final reports. The activities were conducted from February to July 2024. A qualitative method with multiple regression analysis was used to connect assessment technique variables with the development of 21st-century skills. The assessment techniques involved performance assessment (X1), portfolio assessment (X2), project assessment (X3), and peer assessment to determine the formation of 21st-century skills (Y). The research results show that only performance assessment has a partial influence on the development of 21st-century skills. Portfolio and project assessments did not influence the formation of 21st-century skills. The highest 21st-century skills developed were digital/IT literacy, creativity, communication, collaboration, innovation, and critical thinking. An indicator of IT literacy is the ability to access information, evaluate it, and use the information obtained to solve problems.

1 INTRODUCTION

In the business world, 21st-century skills are characterized as skills related to learning and innovation, as well as life and career competencies, alongside technology and information skills (Wijaya et al., 2016). Applying scientific learning models, blended learning strategies, and assessments is crucial for 21st-century skill development (Redhana, 2019). Although scientific approaches are included in lesson plans, in practice, teachers often dominate the learning process (Redhana, 2019). Active learning can foster the application of 21st-century skills (Soares, 2013). Over the last 20 years, education has shifted towards ICT as a key strategy for 21st-century education management, including human resource governance (Sajidan et al., 2018). 21st-century learning principles emphasize student-centered, collaborative, contextual, and community-integrated learning (Bilsen, 2019).

21st-century skills offer an alternative solution for developing student capabilities in the Fourth Industrial Revolution era (Kurniawan et al., 2019). Teachers can incorporate 21st-century skills into their lesson plans (Luciana, 2020). However, educators face challenges in implementing 21st-century skills in schools, primarily due to limitations in IT support and teachers' design skills (Matematika, 2021). Educators should have IT literacy competence and attend workshops to gain 21st-century skills (Handayani, 2017). These skills can be incorporated through the selection of appropriate learning models and methods (Aslamiah et al., 2021). Using the STEM framework in learning can develop 21st-century skills and character building (Waluyo & Wahyuni, 2021).

Field study assessments should be tailored to both classroom and field contexts, as there is no existing model in higher education/universities. field study assessments should evaluate not only the final report but also the entire series of activities, including pre-field study, implementation, and post-field study phases. Effective field study assessments could serve

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as a reference for enhancing 21st-century skills. These skills are critical competencies that should be mastered by students from elementary to higher education levels. This research aims to create an assessment for field study activities that facilitates the development of 21st-century skills.

2 METHODS

This study aims to develop and test an assessment model in field study that can cultivate 21st-century skills. The study population consists of 100 students from the Geography Education and Geography programs at FISH UNJ. Using purposive sampling in a quantitative method, a sample of 30 students was selected. The study employs a qualitative approach with multiple regression analysis. Testing involves examining the relationship and effect of the independent variable (X = assessment model) on the dependent variable (Y = 21st-century skills). This analysis aims to assess how effectively the assessment model improves 21st-century skills. The connection between variables X and Y is described by the following formula:

$$Y=X1+X2+X3$$

Figure 1: Scheme of field study assessment model development.

3 RESULTS

The field study is a practical learning activity designed to provide geography students with hands-on experience in real-world settings. This study focuses on analyzing how field study projects, particularly in social, economic, and mapping areas, contribute to the development of 21st-century skills. The field study program, conducted by the Geography Education Program at Universitas Negeri Jakarta, provides a structured approach to both fieldwork and skill assessment.

In 2024, the field study was conducted in Garung District, Wonosobo Regency, specifically in the villages of Sendangsari and Sitiharjo. Garung District was selected due to its diverse socioeconomic and environmental characteristics, which present rich learning opportunities for students. Dividing participants into various research groups allowed them to explore a range of topics, including mapping, livestock management, community leadership, family education, tourism, population dynamics, disaster preparedness, women's roles, formal education, agriculture, and local trade/SMEs. For this study, our primary focus was on the groups studying population dynamics and agriculture.

The field study consists of three phases: pre-field study (including proposal, instrument development, and initial presentations), field study implementation (involving field presentations and data collection), and post-field study (final posters, comprehensive reports, and concluding presentations). In each of these stages, both product and process evaluations were conducted to assess how effectively students applied and integrated 21st-century skills.

Our findings indicate that the field study approach significantly enhances students' observational, analytical, and evaluative skills. Students reported that the immersive nature of field study helped them bridge theoretical knowledge with practical realities, improving their understanding of complex geographic and social interactions. Additionally, group-based activities promote essential 21st-century skills like critical thinking, collaboration, and communication, supporting the educational goals for preparing individuals for the modern workforce.

Analysis of data from field activities further suggests that field study assignments, which require students to engage directly with communities and environments, lead to higher engagement and motivation. Students were better able to develop context-specific insights and solutions, supporting the need for direct field experiences in geography education. The varied outputs—ranging from field reports to public presentations—serve as evidence of students' enhanced abilities in both theoretical understanding and practical application.

In conclusion, field study is an invaluable tool for equipping students with essential 21st-century skills. The structured assessment model used in this field study, focusing on each phase's deliverables, provides a comprehensive approach to evaluating student progress. This model could be beneficial for other academic programs aiming to develop practical skills alongside theoretical knowledge.

1. Normality Test

   As stated by Ghozali (2011), a regression model is regarded as normally distributed when the

plotted data corresponds with its diagonal. Below is the data plotting against its diagonal.

2. Multicollinearity test
   Ghozali (2011) states that multicollinearity is absent if tolerance values exceed 0.10 and VIF values are below 10.00. In this analysis, the VIF values are as follows: X1 = 1.058 and X2 = 3.338, indicating no multicollinearity among the variables.
3. Heteroscedasticity Test (Scatterplot)
   Based on Ghozali (2011), heteroscedasticity is absent if the scatterplot does not display a clear, wave-like, narrowing or widening pattern, with points distributed above and below zero. The scatterplot here shows no discernible pattern, with points spread above and below zero, suggesting no heteroscedasticity is present.
4. Individual (t-Test) Significance Testing
   Ghozali (2011) notes that if the significance (sig) value falls below 0.05, the independent variable (X) has a significant individual impact on the dependent variable (Y). The significance values for each variable are as follows:
   - Performance (X1): Influences 21st-century skills (Y) with sig. X1 = 0.00 < 0.05.
   - Project (X2): Does not influence 21st-century skills (Y) with sig. X2 = 0.50 > 0.05.
   - Portfolio (X3): Does not influence 21st-century skills (Y) with sig. X3 = 0.16 > 0.05

     The significance values are summarized in Table 1.

Table 1: Significance Values of Variables

Model	Sig.
Performance	.000
Project	.500
Portfolio	.160

Source: Data Analysis, 2024

5. Simultaneous F-Test (Multiple Linear Regression)

According to Imam Ghozali (2011), a significance value of less than 0.05 indicates that the independent variables (X) have a significant simultaneous effect on the dependent variable (Y). The ANOVA table displays a significance value of 0.00, suggesting that X1, X2, and X3 collectively impact Y with a significance level of 0.00 < 0.05. Furthermore, the model summary indicates an R Square of 0.621, meaning that 78% of the variance in Y is accounted for by X1, X2, and X3.

Table 2. 14 R-square result

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.788[a]	.621	.577	4.4436	2.062

a. Predictors: (Constant), Poster, Performance, Report
b. Dependent Variable: Skills

4 DISCUSSIONS

The assumptions for multiple regression analysis were met, including tests for normality, homogeneity, heteroscedasticity (via scatterplot), and autocorrelation. Therefore, both partial and simultaneous tests could be conducted. Only the performance assessment was found to impact the development of 21st-century skills. This assessment was based on observations made during meetings, presentations, and group discussions. To ensure accuracy, recordings of each activity were reviewed to align with data gathered in the questionnaires. This evaluation was conducted individually; participants who were active received higher scores, with each participant being assessed only once for performance. This assessment method was particularly suitable for field activities, as it aligned with participants' experiences in the field. This is consistent with research indicating that assessment in fieldwork includes evaluating performance, daily records, and reflections on field experiences (Ferns & Moore, 2012). General assessment criteria were deemed unsuitable due to their very detailed scoring range, and because instructors were not trained to identify and assess different types of collaborative styles (Suto & Eccles, 2014).

In contrast, portfolio and project assessments did not significantly impact the development of 21st-century skills. The portfolio assessment included various products, such as field study posters, while the project assessment involved final activity reports. These assessments were conducted in groups, making it challenging to accurately evaluate individual contributions. Group-based scoring for projects does not reflect the skills of each individu, as the same score is assigned to all group members. All participants were required to engage in field activities regardless of their economic, intellectual, or physical status (Behrendt & Franklin, 2014). This group mechanism facilitated a dialog of giving and receiving among group members, resulting in a deeper and more mature understanding (Murniati, 2021).

The collective nature of the portfolio and project work often meant only a few group members were actively involved, leading to equal scoring regardless of participation. Similarly, project reports were submitted by study groups and combined into a final report for evaluation, which did not account for individual efforts. This method reflects only the group's collective output rather than individual skills, as the report preparation process was completed collectively, without detailed insight into individual contributions All participants had to take part in field activities irrespective of their economic, intellectual, or physical status (Behrendt & Franklin, 2014), and this group mechanism encouraged a dialog that led to a deeper understanding among members (Murniati, 2021).

The statistical results indicate that the overall field study assessment model significantly impacts 21st-century skill development. The field study sequence—from proposal drafting, meetings, instrument preparation, field study implementation in the field, to group presentations—contributed to skill formation. Overall, field study fostered the 21st-century skills identified in the questionnaire and confirmed by peer statements, mentors, and the field study coordinator. These skills align with competencies in the questionnaire that are relevant to 21st-century requirements. The following is a graph depicting the 21st-century skills developed as a result of the field study.

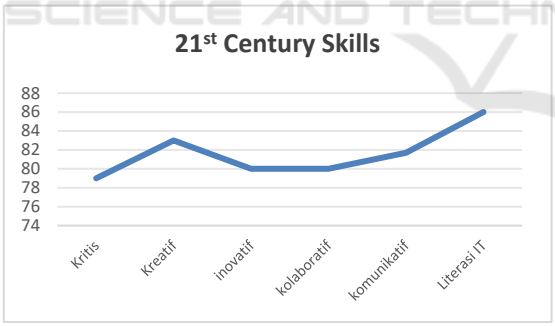

Figure 2: 21st Century Skills

The highest-developed 21st-century skills observed were IT literacy, creativity, communication, collaboration, innovation, and critical thinking. Indicators of IT literacy encompass the capability to access, assess, and utilize information to address problems. Participants demonstrated their skills by gathering information from a variety of sources, both primary (directly from respondents in the field) and secondary (from accessible references). Through these project activities, students gained practical, real-world knowledge. Digital literacy should continue to be developed to ensure that internet users are responsible for the information they obtain, including data security and privacy (Naufal, 2021). To foster responsible information use, a broader understanding of access, analysis, and critical evaluation is needed. Digital literacy scored an average of 3.70, categorized as good, and technological demands have enhanced students' abilities to search for and process information (Asmawi & Arnentis, 2015). Training, workshops, and extracurricular activities can also improve 21st-century skills (Oliquino, 2019). Students can now assess and understand information using available technologies (Khoirunnisa & Habibah, 2020).

Critical thinking received a lower score, with areas such as effective reasoning, rational thinking, and foundational decision-making identified as needing improvement. Enhancing critical thinking skills is essential for processing information effectivelyIndividuals with robust critical thinking skills can use ideas or information, seek out additional relevant data, and assess and adapt it to develop the most effective solutions (Hatami et al., 2017). Connecting learning to real-life contextual problems can help train students to think critically (Sajidan et al., 2018). However, the current implementation of field studies was less effective in fostering rational thinking and foundational decision-making. It is important to incorporate tasks or projects that encourage problem-solving. Group-based projects frequently depend on group leaders, which can hinder the development of individual critical thinking skills, since grades for these projects or portfolios are distributed equally among all members, irrespective of their individual contributions. While group projects teach students how to create structured written reports, tasks are frequently dominated by more knowledgeable students (Fikri, 2020). On the other hand, research shows that critical thinking is enhanced through project-based learning (Utomo et al., 2018). The project-based learning model that incorporates video projects positively contributes to the development of students' critical thinking and creativity skills (Nusfiyah, 2024).

5 CONCLUSIONS

The sequence of activities in the field study included proposal preparation, meetings, instrument development, field implementation, and group presentations. Overall, the field study contributed to the development of 21st-century skills. In the partial analysis, performance assessments were found to influence the development of these skills among

participants, whereas portfolio and project assessments did not have a significant impact. This was because the portfolio and project assessments were group-based, making them less effective for measuring individual skills. The results of the performance assessments can also be applied to other outdoor activities, such as field trips and outings.

In the simultaneous analysis, the overall assessment model had a significant impact on the development of 21st-century skills. The most enhanced skills included IT literacy, creativity, communication, collaboration, innovation, and critical thinking. Indicators of IT literacy consisted of the ability to access, evaluate, and apply information to resolve problems. Participants demonstrated their IT literacy by gathering information from various sources, both primary (directly from respondents in the field) and secondary (from readily available references).

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