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Education students' readiness as professional geographic teachers in the 21st century

Introduction. In the 21st century, geography learning must be understood in a broader context as a part of the whole education with contemporary features and is able to fulfill recent and future challenges. Geography teacher candidates are required to be professional and possess the complexity of the competencies that must be mastered. Consequently, teachers must be more competent in providing quality learning to students following the demands of 21st-century learning.

This study aimed to find the factors determining the readiness of educational students as 21st-century professional geography teacher candidates.

Study participants and methods. The research was carried out using a survey method involving 349 students of geography education from campuses in and outside Java Indonesia. The analysis used was the second-order Confirmatory Factor Analysis (2nd CFA) and Structural Equation Modeling (SEM) analysis technique and continued with descriptive-narrative analysis to describe the achievements of each variable.

Results. The results showed that the Student Readiness as Professional Teacher Candidates of the 21st Century (KMSGP) both in Java and outside Java showed a significant value, which means that all factors influence the formation of the KMSGP. The strongest indicator in the formation of KMSGP in Java and outside Java is Educators Creating an Environment That Respects Learner Diversity (X2) with a significant relationship of more than 84%. Meanwhile, other indicators that are also high are that Educators Understand the Materials They Teach Well (X3) with a significant relationship of 90% for campuses in Java and Educators Show Leadership (X1) with a significant relationship of 88% for campuses outside Java.

Practical significance. Based on the results, the competence of teacher candidates needs to be improved. The efforts can be carried out through tutoring programs, lesson study, designing an authentic learning environment by utilizing learning technology, improve teaching practices in universities, experimental learning, integrating technology in teacher education, teaching multicultural pedagogic skills, self-development, and self-improvement.

Keywords: geographic teachers, students' readiness, professional geography teacher candidates, educational competencies

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Introduction

Education is a dynamic process that develops according to changing times. UNESCO has proposed four primary potential pillars for educational development, namely (1) learning to know, (2) learning to do, (3) learning to live together, and (4) learning to be. In addition, UNESCO emphasizes that teachers must upgrade their knowledge and capabilities to adapt and accommodate both opportunities and challenges on economic, social and cultural life in the 21st century [1].

The competence of teachers primarily determines the development of education as a determinant of the success of a quality learning system. Teacher professionalism and competence must also develop in order to prepare students to be ready to face globalization [2], especially in using technology as a source and contextual learning medium, mastering digital literacy [3], and having a good attitude [4]. High teacher competence, especially critical thinking and problem solving, creativity, collaboration, and communication (4C), can certainly provide quality learning to students [5]. Teachers are not only demanded to master ability to adapt to existing changes [6], but also are required to be competent educating others so that they are ready for changes and adapt to those [7].

According to Nessipbayeva [8], the development of 21st-century educational competencies must be conveyed by educators in their learning. Those competencies include the capability of demonstrating leadership, creating an environment that respects diversity, understanding the content of the material well, facilitating independent learning, and reflecting on teaching practice [8]. Educational universities must be concerned with the demands of globalization and the development of the era in developing their curriculum to produce more competent teacher candidates, including geography education.

The ideal 21st-century geography teacher is a teacher who has professional, social, personal, and pedagogical competencies and integration of pedagogic technology [9]. 21st century teachers must generate student-centered, innovative, active, and technology-equipped learning [10]. They must develop students' curiosity, communicate effectively with them, and make use of technology for learning sake [11]. Geography teachers must master geography well, master how to convey geography, and have good values and attitudes [12]. Geography teachers must also optimize technological sophistication in geography learning because of its urgency in modern life [13]. Geography learning will need digital technologies such as geography information system (GIS), virtual globe, remote sensing, digital map, etc. [14], which basically are beneficial to enhance students' spatial thinking and geography literacy [15]. Good competence from geography teachers is needed given the importance of geography skills for students in the 21st-century era [16].

Nevertheless, the measurement of teaching readiness that leads to 21st-century competencies needs to be reviewed from the geography teacher candidates' perspective because there are no instruments and assessments that assess those competencies possessed by them as of late in Indonesia. Therefore, this study aimed to analyze the factors determining Geography students' readiness as geographic teacher candidates in achieving 21st-century educational competence. This study was conducted to ensure that the quality of the Geography study program is in line with the development of knowledge and technology.

Theoretical background

Teacher quality is often the primary key to student learning performance [17]. Geography teachers take a role to generate attractive geography learning and prepare students with geography skills [18]. Consequently, teacher quality assessment is urged as a way for stakeholders to evaluate teacher education programs. The assessment assesses teacher candidates' readiness both in personal and social terms and concerning 21st-century education.

Teaching readiness can be defined as the condition of teacher candidates to teach professionally. Readiness refers to the optimal level of professional competency development that allows teachers to take responsibility for their work effectively [19]. Strakova [20] stated that readiness to teach is a feeling of being ready for work by considering all aspects and elements contributing to feelings during education. Park, et al. [4] stated that knowledge, attitudes, and interests are specific elements measuring teacher readiness. In addition, [10] added that the characteristics of the 21st Century are that learners must integrate technology in learning. Furthermore, in particular,

Cochran-Smith [21] states that to assess how the outcomes of teacher education can be done with three approaches, namely 1) through evidence about the professional performance of prospective teachers; 2) through evidence about teacher value (measuring knowledge for teaching and about teaching; and 3) through evidence about the impact of teaching on students' abilities. In this study, the assessment was carried out using the second approach, namely measuring the readiness and competence of teachers through measuring their competence with a measuring instrument in the form of a questionnaire so that students can find out what score the prospective teacher has obtained. Professional teachers have many indicators, including [22] which shows 90 key professional teacher factors grouped into eight major groups, namely Knowledge, Pedagogic, Evaluation, Class Management, Communication, Social and Emotional, Culture, Attitudes, Ethics, Learning to teaching, and professional values.

Nessipbayeva [8] describes the competencies of modern 21st century teachers at least having leadership, creating a friendly environment for differences, understanding material, ability to be a student facilitator, and ability to reflect. Many identifications are related to the competence of professional teachers in the 21st century as described above, further [23] explain the importance of multicultural understanding for teachers in learning, and of course this is very important amidst At the moment. Globalization, multiculturalism, and the development of information and communication technology also bring ethical challenges, so skills and competencies related to ethics and social impact are very significant for citizens in the 21st century [24]. The complexity associated with professional teachers in the 21st century makes the authors summarize them into several groups as described in table 1.

Table 1

Factors Forming 21st Century Professional Teachers

No	Factor	Item Indicator	Source
1	Educators Demonstrate Leadership	5	[8; 22]
2	Educators Create an Environment that Respects the Diversity of Learners	5	[8; 25; 26]

3	Educators Understand the Content of Everything They Teach Well	4	[8; 22]
4	Educators facilitate learning for their students	8	[8; 10]
5	Educators Reflect on Their Teaching Practices	3	[8]

Research methods

1. Research model

This research is an exploratory observational study that uses a survey method designed to analyze the factors that shape students' readiness as professional geography teacher candidates in the 21st Century. The design of the factor analysis in this study confirms the theories that have been used as the basis for the formation of the model research and determines the fit between the research model and the research sample.

2. Participants and data collection

The population of this study is students who are currently pursuing a bachelor's degree (S1) in geography education in all campuses in Indonesia, while 349 respondents were selected using the random sampling method [Table 2]. Data collection was done by filling out an online questionnaire through the google-form platform. The relationship between students' readiness constructs as 21st-century professional teacher candidates (KMSGP) is presented in Table 3.

Table 2

General description of respondents

Demographics		Java		Outside Java	
		N	%	N	%
Total	200	57.31	149	42.69	
Semester	<4	58	16.62	38	10.89
	4—7	105	30.09	95	27.22
	>7	37	10.60	16	4.58
Status of Campus	State	149	42.69	117	33.52
	Private	51	14.61	32	9.17

Table 3

Teaching Competencies of 21st Century Teachers

Latent Variable	Indicator	Sub Indicator	Code
Student Readiness as Professional Teacher Candidates of the 21st Century (KMSGP)	Educators Show Leadership (X1)	Educator Leads in Class	X1.1
		Educators demonstrate leadership at school.	X1.2
		Educators do the teaching.	X1.3
		Educators support schools and students.	X1.4
		Educators demonstrate high ethical standards.	X1.5

	Educators Create an Environment That Respects Learner Diversity (X2)	Educators provide an environment that supports positive relationships between students and nurture them in the learning environment	X2.1
		Educators embrace diversity in schools.	X2.2
		Educators treat students as individuals by maintaining a learning environment that provides high expectations.	X2.3
		Educators adapt their learning for the benefit of students with special needs.	X2.4
		Educators work collaboratively with students' parents by communicating and collaborating with the home or community to benefit students.	X2.5
	Educators Understand The Materials They Teach Well (X3)	Educators develop and implement effective learning through guiding effective literacy teaching across curriculum and teaching content to enhance student learning	X3.1
		Educators determine the material appropriate to their teaching specialization.	X3.2
		Educators show that they understand the relevance of particular subject areas or disciplines very well.	X3.3
		Educators make their teaching relevant to students through the integration of 21st-century21st-century skills and content into learning.	X3.4
	Educators facilitate learning for their students (X4)	Educators show that they understand very well how learning takes place as well as the level of intellectual, physical, social, and emotional development of students	X4.1
		Educators plan to teach according to student circumstances	X4.2
		Educators demonstrate their intelligence and versatility by using various methods and materials that suit the needs of all students.	X4.3
		Educators demonstrate their awareness of the potential of technology to enhance learning by integrating technology into their learning to maximize student learning.	X4.4
		Educators help students grow as thinking individuals by integrating specialized teaching that helps students develop the ability to think critically and solve problems.	X4.5
		Educators help students work in teams and develop leadership qualities by organizing learning teams to develop student collaboration and leadership.	X4.6
		Educators embrace students	X4.7
		Educators assess what students have learned.	X4.8
	Educators Reflect on Their Teaching Practice (X5)	Educators analyze student learning using data to provide ideas for anything that can be done to improve student learning.	X5.1
		Educators link professional growth with their professional goals by following recommended activities to develop learning and professional competence.	X5.2
		Education plays an influential role in a complex and dynamic environment using a variety of scientific approaches to improve the quality of learning.	X5.3

3. Data analysis

the analytical technique used is the Confirmatory Factor Analysis Second Order (2nd CFA) Structural Equation Modeling (SEM) analysis technique. The data were analyzed structurally and described in a narrative descriptive manner to explain the relationship between the results of the SEM test and the factual conditions stated in the survey.

Study Results

Factors Forming Student Readiness

This study compares the Readiness of 21st Century Professional Teacher Candidates for students at the campuses in Java and outside Java. Teacher candidates from campuses outside Java dominated respondents in this study. Based on the distribution of respondents

by semester and campus status, the average number of students are semesters 4 to 7, and more than 30% study at state campuses both in Java and outside Java (Table 2).

The results of the analysis are displayed in three outputs, namely the measurement model output (standardized output), the estimated structural model output, and the overall model output (GOF). The measurement model output (standardized output) is the output used to test the validity and reliability of the construct. The measurement model used in this measurement is CFA 2nd order (2-level construct) where a latent variable is measured by indicators and their sub-indicators. The output estimate of the structural model is used to measure the level of significance of the causality relationship between indicators and their latent variables, while the overall output model (GOF) is used to test the level of compatibility of the model with the research sample. The results of this SEM analysis will be presented in comparison between a sample of students from the Java region and a sample of students outside Java. The measurement model output is shown in Figure 1.

The readiness of geography students as 21st-century professional geography teacher candidates is essential for campuses and the development of the world of education. The measurement results from the comparison show that there are no significant differences between the two (Table 4). The similarity of information on teacher candidates from campuses in Java and outside Java is probably due to equal access to information and technology related to teacher competence. In addition, the educational curriculum at the university level for teacher candidates is a systematized and standardized educational instrument at the national level. Standardizing the curriculum at the university level is part of maintaining the minimum educational standards that must be met at the university level so that there are no gaps.

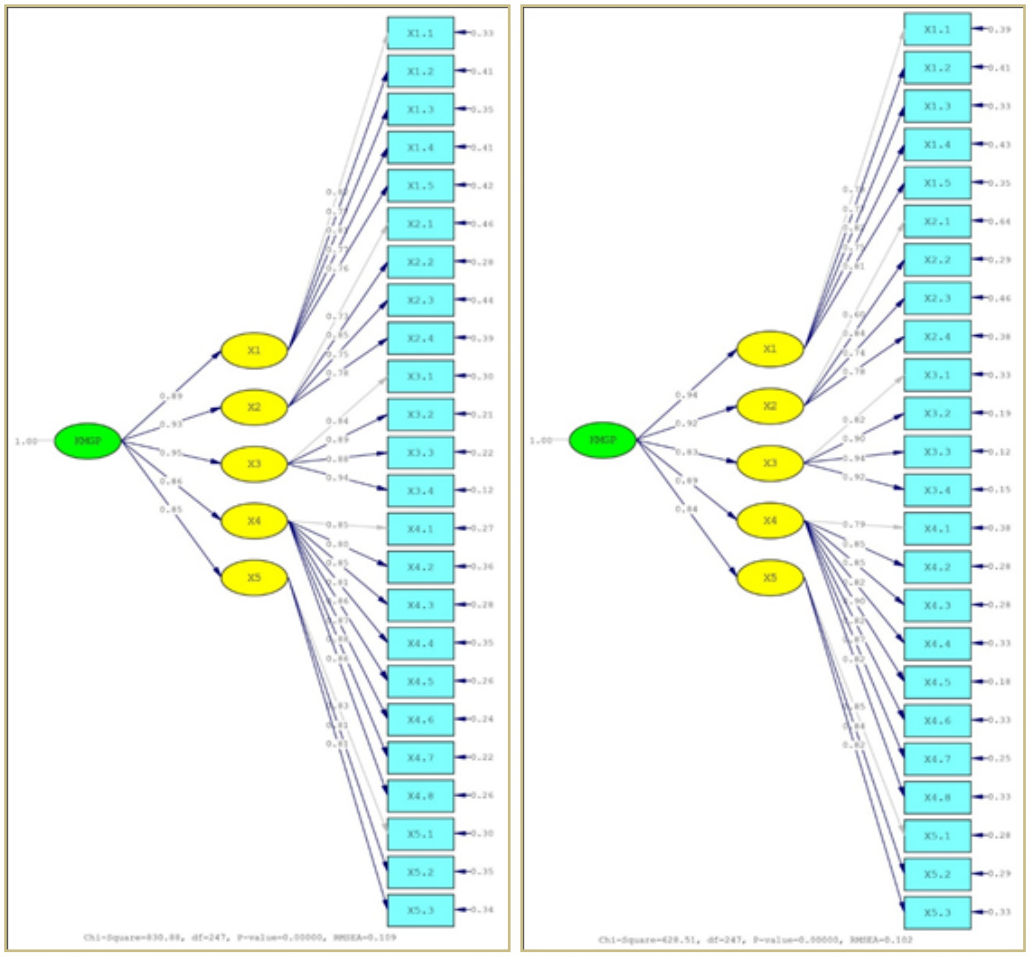

Figure 1 Standardized Measurement Model Output

Table 4

Descriptive Average Score for each Sub-Indicator in Java and Outside Java

Variable		Code	Java		Outside Java	
			Average score (%)	Category	Average score (%)	Vategory
Readiness of students as future professional teachers in the 21st Century (KMGP)			79.45	high	81.05	high
Educators Show Leadership (X1)	show leadership attitude in class	X1.1	77.33	high	79.19	high
	show leadership attitude in school	X1.2	77.08	high	77.68	high
	carry out the teaching duty	X1.3	78.44	high	79.15	high
	support schools and students	X1.4	88.69	high	90.44	high
	demonstrate high ethical standards	X1.5	89.00	high	89.93	high
Educators Create an Environment That Respects Learners' Diversity (X2)	provide an environment that supports positive relationships between students and nurtures the learning environment	X2.1	83.63	high	84.90	high
	embracing diversity in schools	X2.2	79.78	high	81.38	high
	treat students as individuals by maintaining a learning environment that provides high expectations for each student	X2.3	74.63	medium	77.18	high
	adapt their learning for the benefit of students with special needs	X2.4	84.06	high	86.87	high
Educators Understand the Materials They Teach Well (X3)	develop and implement effective learning through guiding effective literacy teaching across curriculum and teaching content to enhance student learning	X3.1	77.63	high	80.03	high
	determine the material appropriate to their teaching specialization	X3.2	77.98	high	81.44	high
	show that they understand very well the relevance of particular subject areas or disciplines	X3.3	78.29	high	81.32	high
	make their teaching relevant to students through the integration of 21st-century skills and content into learning	X3.4	78.68	high	80.51	high
Educators facilitate learning for students (X4)	show that they understand very well how learning takes place as well as the level of intellectual, physical, social, and emotional development of students	X4.1	76.81	high	78.27	high
	planning teaching according to student circumstances	X4.2	75.88	medium	77.85	high
	demonstrate their intelligence and versatility by using various methods and materials that suit the needs of all students	X4.3	76.50	high	79.03	high
	demonstrate their awareness of the potential of technology to improve learning by integrating technology into their learning to maximize student learning	X4.4	79.73	high	80.29	high
	helps students grow as thinking individuals by integrating specialized teaching that helps students develop the ability to think critically and solve problems	X4.5	76.72	high	78.19	high
	help students to work in teams and develop leadership qualities by organizing learning teams to develop student collaboration and leadership	X4.6	80.00	high	80.37	high

	sympathetic and empathetic to the conditions and problems of students related to learning	X4.7	76.75	high	79.28	high
	assess what students have learned	X4.8	75.81	medium	76.09	high
Educators Reflect on Teaching Practice (X5)	analyze student learning using data to provide ideas for anything that can be done to improve student learning	X5.1	84.54	high	84.51	high
	linking professional growth with their professional goals by following recommended activities for the development of learning and professional competence	X5.2	84.56	high	85.99	high
	play an influential role in a complex and dynamic environment using a variety of scientific approaches to improve the quality of learning	X5.3	79.25	high	79.45	high

Determining aspects for students' readiness as teacher candidates in the 21st Century

The achievement value of this aspect is presented in the form of SEM output comparison between a sample of students from Java and outside Java. The assessment results show that the value of each aspect of competence as a latent variable is validly and reliably represents KMGP achievements (Figure 2).

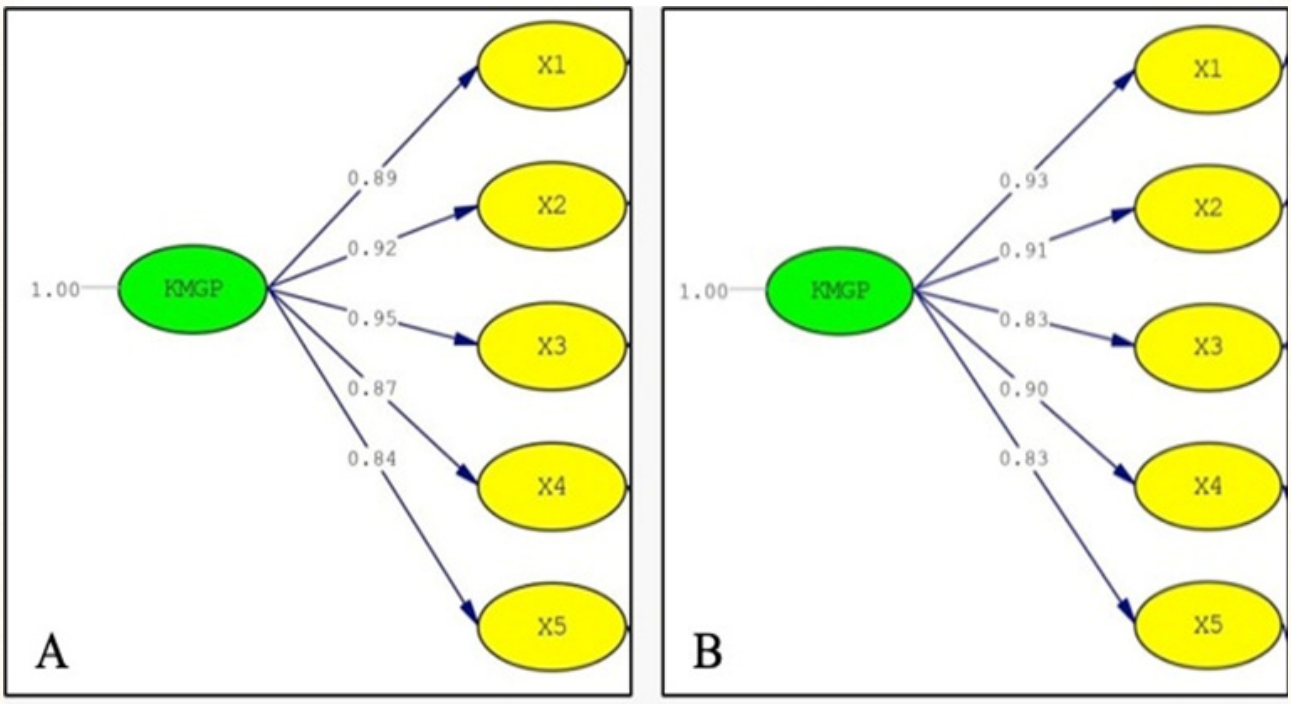

Figure 2 The output of the Standardized Measurement Model

As explained in Table 5, all constructs for each latent variable, both in CFA 1st order and CFA 2nd order, have a standardized loading factor value (λ) > 0.5 so that it can be concluded that each sub-indicator and indicator is valid in forming or reflecting the latent variable of 21st Century KMGP. Furthermore, the value of each construct of the latent variable has a construct reliability (CR) value of 0.70 and a value of variance extracted (VE) 0.50 both in samples from Java and outside Java, so it can be concluded that each sub-indicator and indicator is reliable in forming or reflecting the latent variable of Student Readiness as Professional Teacher Candidates of the 21st Century (KMGP) both in the sample of Java and outside Java, then the results of the structural model test are shown in Figure 3 below.

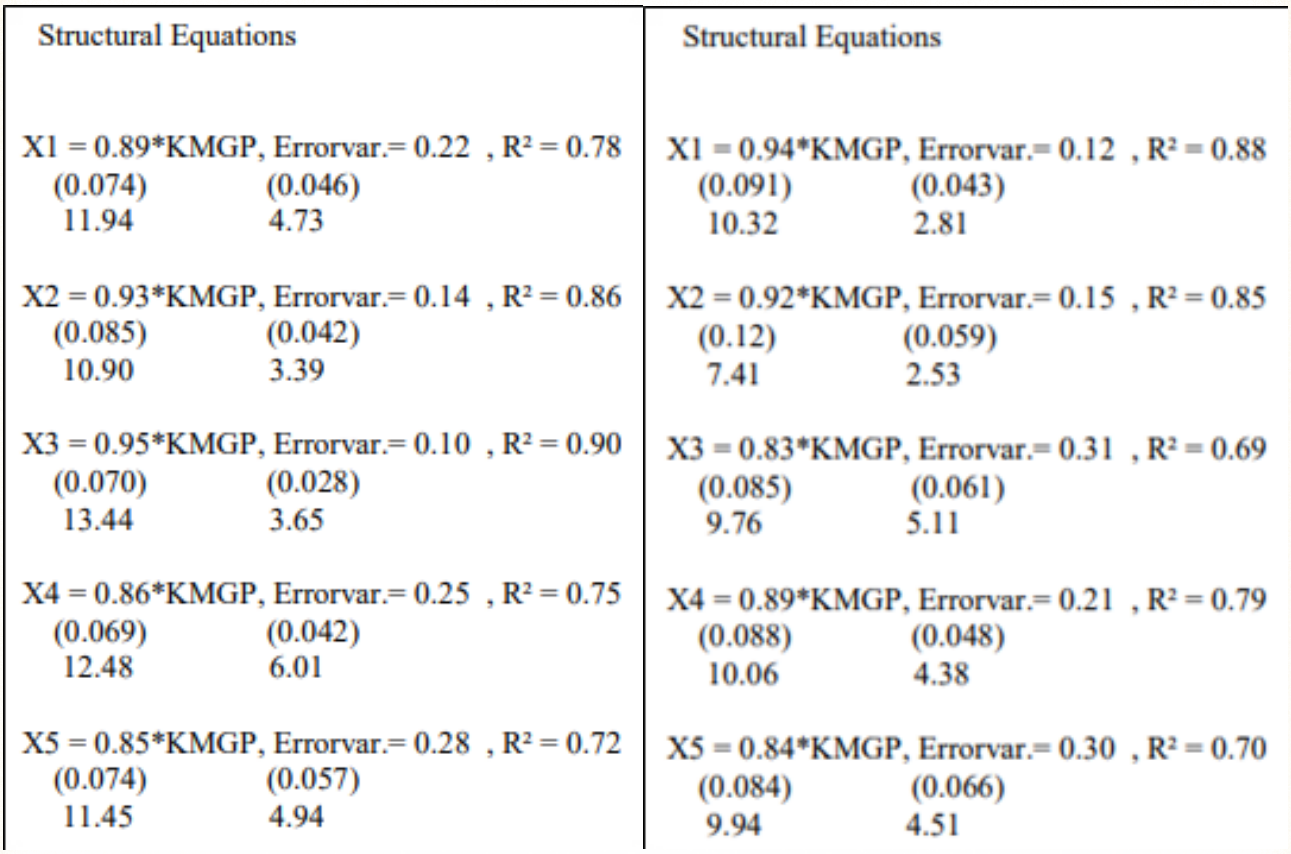

Figure 3 Structural Model Test Output

Evaluation of the structural model (causality relationship between indicators and KMGP variables) includes an examination of the significance of the estimated coefficients. Things that are evaluated on the suitability of the structural model, namely the t-value & coefficient of the structural equation and overall coefficient of determination (R^2). The t-count value is significant if the t-count is ≥1,96 in each causal relationship between latent variables. The significance test of the t-count values and coefficients is presented in Table 5.

Table 5

The significance test of t-count and coefficient of structural equations

Path	Estimate	Error Var.	R^2 (%)	t-value	Description
Java campus model					
KMGP → X1	0.89	0.22	78	11.94	significant
KMGP → X2	0.93	0.14	86	10.9	significant
KMGP → X3	0.95	0.1	90	13.44	significant
KMGP → X4	0.86	0.25	75	12.48	significant
KMGP → X5	0.85	0.28	72	11.45	significant
Outside Java Model					
KMGP → X1	0.94	0.12	88	10.32	significant
KMGP → X2	0.92	0.15	85	7.41	significant
KMGP → X3	0.83	0.31	69	9.76	significant
KMGP → X4	0.89	0.21	79	10.06	significant
KMGP → X5	0.84	0.3	70	9.94	significant

Based on Table 5, it can be seen that the causality relationship between X1, X2, X3, X4, and X5 with KMGP is significant in both Java and outside Java samples with an average impact size of more than 70%. In the sample of campuses in Java, the highest indicators in forming the KMGP variable are X2 and X3 with a significant relationship of more than 85%, while on campuses outside Java, the highest indicators in forming the KMGP variable are X1 and X2 with a significant relationship of more than 84%.

Evaluation of the overall suitability of the model is evaluated first to determine the suitability with the research sample. Evaluation of the model's overall fit (GOF) can show whether or not the research model is applied to the sample. GOF test results are shown in Table 6.

Table 6

GOF Test Results Modified Model

GOF	Acceptable match rate	Indonesia		Malaysia	
		Model index	Description	Model index	Description
Chi-Square	Chi-Square ≤ 2df (good fit), 2df < Chi-Square ≤ 3df (marginal fit)	523.62	marginal fit	482.17	good fit
p-Value	p≥0,05	0.00	good less	0.00	good less
NCP	The smaller, the better	339.89	good fit	237.17	good fit
GFI	GFI≥0,9 (good fit), 0,8≤GFI≤0,9 (marginal fit)	0.8	marginal fit	0.79	good less
RMR	RMR≤0,05	0.018	good fit	0.020	good fit
RMSEA	0,05<RMSEA≤0,08 (good fit), 0,08<RMSEA≤1 (marginal fit)	0.083	good fit	0.081	good fit
ECVI	The closer to the saturated ECVI value, the better	3.49	good fit	4.00	good fit
NNFI	NNFI≥0,9 (good fit), 0,8≤NNFI<0,9 (marginal fit)	0.98	good fit	0.98	good fit
NFI	NFI≥0,9 (good fit), 0,8≤NFI<0,9 (marginal fit)	0.97	good fit	0.96	good fit
AGFI	AGFI≥0,9 (good fit), 0,8≤AGFI<0,9 (marginal fit)	0.76	good less	0.74	good less
RFI	RFI≥0,9 (good fit), 0,8≤RFI<0,9 (marginal fit)	0.97	good fit	0.96	good fit
IFI	IFI≥0,9 (good fit), 0,8≤IFI<0,9 (marginal fit)	0.98	good fit	0.98	good fit
CFI	CFI≥0,9 (good fit), 0,8≤CFI<0,9 (marginal fit)	0.98	good fit	0.98	good fit
PGFI	PGFI≥0,5	0.66	good fit	0.64	good fit
PNFI	PNFI≥0,5	0.87	good fit	0.85	good fit
AIC	The closer to the saturated AIC value, the better	693.89	good fit	592.17	good fit
CAIC	The closer to the saturated CAIC value, the better	926	good less	812.39	good less
CN	CN≥200	115.21	good less	88.46	good less

Description: NCP = Non-Centrality Parameter; SNCP = Scaled Non-Centrality Parameter; GFI = Goodness-of-Fit Index; RMR = Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; ECVI = Expected Cross-Validation Index; AGFI = Adjusted Goodness-of-Fit Index; TLI/ NNFI = Tucker-Lewis Indeks/ Non Normed Fit Index; NFI = Normed Fit Index; RFI = Relative Fit Index; CFI = Comparative Fit Index; IFI = Incremental Fit Index; PNFI = Parsimonius Normed Fit Index; PGFI = Parsimonius Goodness-of-Fit index; AIC =Akaike Information Criterion; dan CAIC = Consistent Akaike Information Criterion.

According to the analysis, 12 of the 18 GOFs met the criteria of a good fit, 2 measures indicated the criteria for marginal fit, and 4 measures indicated the criteria for good less on the Java campus model. Meanwhile, the outside Java campus model showed that

11 out of 18 GOFs achieved the criteria of a good fit, 2 measures indicated the criteria for marginal fit, and 5 measures indicated the criteria for good less. Based on these criteria, it can be concluded that the constructed model of the factors determining Student Readiness as Professional Teacher Candidates in the 21st Century has reached the suitable criteria. In other words, the sample covariance matrix is not much different from the estimated covariance matrix. This indicates that the constructed scheme of the factors determining the 21st Century KMBP that was built represents the condition of the variables in the sample of respondents involved. Furthermore, the results of model modification were evaluated like the previous model, namely the evaluation of the measurement model (2nd and 1st order CFA), evaluation of the structural model, and evaluation of the overall model (GOF).

Discussion and Conclusion

The results of this study indicate that the competence of determining the 21st Century KMGP has reached the suitable criteria. Further, they indicate that the factors that shape readiness are per the theory used in the study. Students of geography education in Java tend to create an environment that respects the diversity of students and understands the material being taught well. Meanwhile, on campuses outside Java, teacher candidates are more dominant in having competencies that demonstrate leadership and create an environment that respects the diversity of students. This is relevant to the different sociographic conditions in the two research sample locations. Students' background in Java tends to be diverse and more competitive in the academic field.

This study shows that the competence of teacher candidates also needs to be improved, especially in terms of understanding geography material based on technological developments. Several ways that can be done to improve teacher readiness are through tutoring programs, lesson study, and designing an authentic learning environment by utilizing learning technology [27]. Lesson study plays an essential role in the education of teacher candidates in higher education because teachers teach the way they learn [28]. Universities must increase lesson studies related to teacher competence, especially pedagogic competence, so that the weight is balanced with academic lesson study because so far, pedagogic competence has less weight in university lesson study [29].

Another strategy to improve teacher candidates' readiness is to improve teaching practices in universities, one of which is through microteaching. Practicum not only bridges the gap between theory and practice in learning to teach but also provides teacher candidates opportunities to develop their teaching competencies [30]. Microteaching helps them develop their skills at the beginning of learning, prepare lesson plans, choose appropriate learning objectives and resources, speak in front of the class, manage time effectively, and apply appropriate assessment techniques [31]. However, a study from [32] states that many student-teacher candidates are less serious in microteaching because they only teach their classmates and do not show adequate knowledge about the application of various innovative teaching strategies. Microteaching is also still experiencing problems due to its setup and unreal nature, lack of feedback from fellow friends and lecturers, and lack of practice time [33]. A study from He & Yan [34] state the same findings.

Further experimental learning efforts are needed to complete the various shortcomings in microteaching, one of which is a direct practice program in schools. Experiential learning

in schools is essential training in the current teacher education program [35]. Experiential learning provides opportunities for teacher candidates to feel and experience teaching in a natural environment [36]. In-school practice programs allow teacher candidates to identify their strengths and weaknesses as they will practice directly in school and apply what they learn in college. Then, they will also receive guidance, assistance from professional tutors, namely teachers at the schools where they practice [37]. Both supervising teachers and lecturers play essential roles in the development of teaching skill including learning rhythm, differentiation, and innovation for engaging activities [38]

Practice in schools allows teacher candidates to develop abilities to communicate and ask [39], observe how teachers in schools teach and break down lesson plans with teachers and can engage with students so that they have the opportunity to work, talk, and share with students and apply what they learn in college [40]. Microteaching and direct practice in schools are suitable formulations in increasing teacher readiness because microteaching is a provision for teacher candidates to engage in practice at school [41], and it will provide an extraordinary experience for them to feel the school environment, carry out their duties and roles as teachers and behave according to the real identity of a teacher [42] such as managing class, organizing learning, and carrying out evaluation [43].

Several other studies state that practice in schools contributes to improving the competence and readiness of teacher students [43]. A similar study was done by Kihwele & Mtandi [44]. Therefore, improving the curriculum and teaching quality in higher education, especially in implementing practice in schools, has a vital urgency [46]. In addition, supervision or mentoring from teachers in schools is critically important in the success of teacher candidates [47]. Teachers or mentors from school act as peers for discussion, introduce school culture, and do other teaching experiences [45].

Integrating technology in teacher education is also essential to increase their readiness to be a teacher. Furthermore, including psychological content on the educational process of teacher candidates must be implemented, too. Teachers' expertise in their field will be enhanced if they understand their learning content well [10]. To produce teachers who are professional and able to implement technology-based 21st-century learning, the teaching curriculum of teacher candidates in higher education must also implement technology-based education so that they have guidelines, role models, or an overview of innovative learning [48] and even accustomed to using technology in learning [49].

In addition, multicultural pedagogic skills are also fundamental to be taught in universities, so that teacher candidates can create a learning environment that respects the diversity of students. Teachers can plan, implement, and conduct learning assessments according to student conditions, abilities, and diverse backgrounds [25]. In addition, the ability to communicate and establish relationships with parents and school administration is no less essential to be taught in teacher education programs at universities [50].

The ability of a teacher candidate also can be improved through self-development and self-improvement, for example, by increasing goals, expanding self-knowledge and skills, self-education needs, learning problem-solving skills, self-assessment skills, increasing skills to implement self-control in gaining professionalism during the study process [51].

This study shows that every educator competency that demonstrates leadership creates an environment that respects diversity, understands the material's content well, facilitates independent learning, and reflects on teaching practice significantly represents the 21st-century KMGP for geography education students on campuses outside Java. The strongest (high) competence in determining the 21st Century KMGP is to create an environment

that respects the diversity of students and understands the content of the material well for students on the Java campus with an R^2 of more than 80%, which is not significantly different from campuses outside Java.

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