Preparing Pre-Service Teachers for the 21st Century Education A Comparative Study of Two Teacher Education Programs

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Abstract— This comparative study aimed at exploring teacher education programs held by two different state universities in Palembang, Indonesia and Khartoum, Sudan in preparing pre-service teachers for the 21st century education. Kereluik's et al. (2014) framework of 21st century education was used as the framework for the study. The data of the study were obtained through documentation, survey, and interview. Documentation was related to written documents of the programs. More than one hundred and sixty respondents filled in the questionnaire. Eight respondents participated in the interviews. Quantitative data obtained from the survey were analyzed using SPSS, while qualitative data from documentation and interview were analyzed based on thematic analysis. Documentation proved that basically both programs had many things in common in the implementation of teacher education program in the 21st century education, regardless of some differences. Both of them implemented 21st century learning framework to a certain extent although encountering some limitations. Findings from the questionnaire revealed that lecturers of both programs had practiced the 4-Cs (Critical thinking, Collaboration, Communication, and Creativity and Innovation skills) in their classes during teaching and learning process to a certain extent. Findings from the interview revealed that (1) both programs accommodated two kinds of knowledge based on Kereluik's et al. (2014) framework of 21st education into their curriculum foundation knowledge and humanistic knowledge, whereas they varied in their response to metacognitive knowledge. This study provides information for the authorities of the two institution show each teacher education program had prepared its pre-service teachers for the 21st century education and what necessary actions need to take in order to meet the 21st century education demands

Keywords: pre-service teacher, teacher education, 21st century education

I. INTRODUCTION

The 21stcentury is characterized by information blast; more and more countries are realizing that teachers are the most important single element of the state education system. Therefore, to prepare highly qualified teachers has become a great necessity for governments over the world. How to prepare teachers in the 21stcentury is the concurring topic that both western and eastern countries are issuing now. In western countries such as the United States and England, teachers are required to meet the needs of how to improve the multi-cultural teaching competency for the growing diverse populations and promoting the pre-service teacher education quality by university-school partnership. Meanwhile, in eastern countries such as China and Indonesia, teachers in the rural area encounter the challenge how to get continuing professional development and engaging in professional learning community by collaborating with peers and parents. In order to meet the challenges, the eastern countries can learn the experiences from western countries, and vice versa. Thus, the question of how to prepare highly qualified teachers in the 21stcentury needs to be raised in the global contexts.

Indonesia as part of the global world needs to be ready in dealing with challenges of the 21st century, one of which is in

education field. In other words, Indonesian education needs to accommodate issues of the 21st century learning so those Indonesian citizens are able to compete in this globalized world. One such factor that determines qualified education is teacher. Therefore it is crucial to prepare pre-service teachers who possess knowledge and skills that are necessary in responding to the challenges of this 21st century.

One of the objectives of the Indonesian independence as stated in the UUD 1945 is to escalate Indonesian people education quality equally and justly. Referring to this objective, the development of national education is based on the paradigm of developing whole Indonesian people who have the capacity to actualize human potency optimally in this 21st century. In order to develop whole Indonesian people who have such a capacity, the provision of qualified teachers are certainly required, especially in this 21st century.

In responding to the demand of providing qualified teachers for the 21st century, some serious efforts have been taken by the Indonesian government. One of them is the issuance of some laws and regulations related to education, such as Law No 20/2003 about the System of National Education; Law No 14/2005 about Teacher and Lecturer; Government Regulation No 19/2005 about National Education Standard; and Minister of National Education Regulation No 16/2007 about Teacher's Competence and Academic Qualification Standard [1-4]. These laws and regulations mandate that teachers play a strategic and crucial role in fostering the quality of education in building the national education in this 21st century. As the agent of change, teachers need to be qualified and competent in their disciplines. Qualification and competence can be achieved through a stage of education process. A teacher education is the place where such a process takes place. It is a place where future teachers are educated, trained, and prepared. So important is the role of a teacher education that it needs to be planned, organized, and managed seriously.

One of the teacher education institution that belongs to one public university in South Sumatera province, Indonesia (thereafter, called TEPIN) aims at producing qualified and professional teachers. This objective is in line with the vision and mission of the faculty in providing qualified pre-service teachers who are competent to fulfil the national demand and are able to compete in globalized world as well. It has been operating for more than forty years and has been working collaboratively with other local and national educational institutions, such as the Education Provincial Office Provincial Quality Assurance Institute, Education and Culture City Office, and other partner-schools in primary and secondary education. Furthermore, international collaboration in terms of student-exchange program, inviting students from overseas to study, and international collaborative research has also been conducted.

One of such collaborative research conducted was between TEPIN and a teacher education program in Khartoum, Sudan (thereafter, called TEPIS). Both of the teacher education programs are dealing with the provision of prospective teachers in this 21st century. There may be some similarities and differences in terms of policy and the implementation of the program. Therefore it is worth investigating to find out the typical characteristics of each. One could learn from the expertise of the other or vice versa. Therefore, each could benefit from the other.

In general, the objective of this study is to explore how TEPIN and TEPIS prepare pre-service teachers for the 21st century education. Specifically this study is aimed at describing the students' recruitment procedures, the level of education unit the students train for, the knowledge the two programs focus on in the curricula, and the teaching practices. In addition, it is also aimed at exploring the teacher educators' perception of the 21st century education, teacher educators' response on the 21st century education, exploring the two faculties response to the quality assurance and accreditation as the requirement of sustainable development of the 21st century education, exploring the challenges the two faculties have, and the problems the two faculties encounter in preparing pre-service teacher for the 21st century education.

II. LITERATURE REVIEW

A. Twenty-first Century Skills

As teachers play a crucial role in achieving qualified education teacher education program should be able to prepare pre-service teachers to acquire the knowledge, skills, and dispositions that will allow them to succeed in their job. In relation to this, teachers living in this era need to have 21st century skills. They need to be familiar with the skills and integrate them throughout the curriculum. [5] points out that learning for the 21st Century articulates a vision of how schools can best prepare students to succeed in the 21st century. Its emphasis is on what students can do with knowledge, rather than what units of knowledge they have, is the essence of 21st century skills [6]. In particular, complex thinking and analytical skills are needed in all level of education [7-8].

The issue of what 21st century students need to know has been receiving much attention. Educational demands of this new century require new ways of thinking and learning [9-10]. As teacher educators, we are particularly sensitive to what 21st century learning means in terms of the knowledge teachers must possess and how to best facilitate that knowledge. Today's students, due to their immersion in technology, are fundamentally different from students in the past-and thus by implication have-different learning goals and necessitate different teaching approaches.

[11] asserts that schooling practices are designed to prepare citizens for the industrial age. [12] has also argued that the lab our force required by an increasingly globalized economy requires an altogether different model of education-one that accommodates 21st century demands. These ideas are reasonable because it will aid in determining what and how students are taught and in turn how teachers are trained and prepared to do this. Numerous institutions, organizations, and individuals responded to the call for a 21st century knowledge framework by identifying the student knowledge necessary for living and learning in the 21st century.

B. The 21stCentury Knowledge Frameworks

[13] reviewed and analyzed fifteen available frameworks of 21st century learning. They identified that basically there are three broad categories of knowledge that are necessary for 21st century learning Foundational Knowledge, Meta Knowledge, and Humanistic Knowledge. Each category is comprised of references from several, and in most cases a vast majority, of the frameworks. Each category represented a different realm of knowledge, as illustrated in Figure 1. Each of these overarching categories and subcategories are described below.
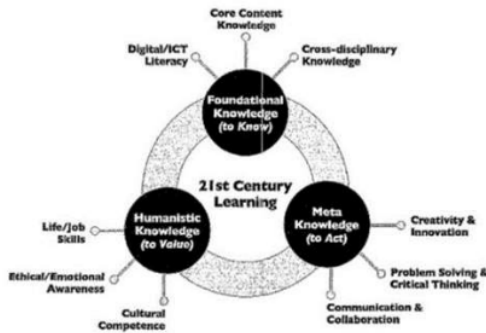

Fig. 1. Twenty-first Century Learning Frameworks [13]

Foundational Knowledge is the answer to the "what" question (i.e., "What do students need to know?"). It includes three key subcategories: Core Content Knowledge, Digital Literacy, and Cross-Disciplinary Knowledge. Core content knowledge is characterized by highly complex and deeply embedded mental processes specific to conventional domains, such as applying mathematical ways of thinking to solve everyday problems or applying scientific ways of thinking to understanding the natural world [9]. Digital and Information Literacy refers to the ability to effectively and thoughtfully evaluate, navigate, and construct information using a range of digital technologies and thus to function fluently in a digital world. Cross-Disciplinary Knowledge integrates and synthesizes information from across fields or domains, such as the application of knowledge to new contexts in the pursuit of specific end goals.

Meta Knowledge includes knowledge of the process of working with foundational knowledge. It also involves three subcategories: Problem Solving and Critical Thinking, Communication and Collaboration, and Creativity and Innovation. Problem solving and critical thinking refers to the ability to interpret information and make informed decisions based on such information. Problem solving is often conceptualized as the use of critical thinking skills toward the effective resolution of a specific problem or toward a specific end goal. In communication and collaboration communication involves the ability to clearly articulate oneself through all media of communication oral, written, nonverbal, and digital as well as the skills necessary to be an active and respectful listener to diverse audiences, while collaboration includes similar dimensions as communication but also includes

important individual contributions, such as flexibility willingness to participate, and recognition of group and individual efforts and success. Creativity and innovation involve applying a wide range of knowledge and skills to the generation of novel and worthwhile products as well as the ability to evaluate, elaborate, and refine ideas and products.

Humanistic Knowledge offers a vision of the learner's self and its location in a broader social and global context. The subcategories of this knowledge are: Life/Job Skills/Leadership, Cultural Competence, and Ethical/Emotional Awareness. Life skills, job skills, and leader ship serve to create lifelong learners who are capable of success beyond the confines of the classroom [14-16]. Cultural competence includes aspects of personal, interpersonal, and intercultural competence evidenced through effective communication, collaboration, and appreciation of ideas and emotions of all types of individuals. Ethical and emotional awareness include the knowledge and skills necessary for success in a culturally diverse society.

C. Implications for Teachers and Teacher Educators

[13] framework provides some specific recommendations for teachers and teacher educators. First, disciplinary knowledge and domain knowledge are as important as ever and will continue to be so well into the foreseeable future. Educational systems remain fundamentally based on disciplinary knowledge and, as such, require teachers to be adequately trained and proficient in the disciplines. The need for students to develop deep disciplinary knowledge has always been important; what has changed is access to disciplinary knowledge and authentic disciplinary inquiry made available through technology and subsequently experts and resources. Students and teachers must work in purposeful learning communities, engage with questions that require reflection, defend conclusions and problem-solve like detectives while responding like investigative reporters. Therefore, the current base of disciplinary knowledge encompasses both traditional content knowledge and concepts forwarded in modern frameworks, such as students having strong communication skills integrated across content areas, being metacognitive in an iterative process, engaging with complex texts and complex problem solving, and developing a world focus.

Second, knowing the technology is important, but knowing when and why to use it is more important. This is closely related to the TPACK framework and knowledge that teachers must possess to teach effectively with technology [17]. However, it is distinctly different in that the TPACK framework is admittedly content neutral and pedagogically neutral. Conversely, this framework identifies and places great emphasis on the foundational knowledge that students and teachers must possess. In other words, basic digital literacy skills are essential for both students and teachers. Knowing when to use a particular technology for activities such as collaboration, or why to use a certain technology for acquiring specific disciplinary knowledge, is a vastly more important, transferable, infinitely relevant type of knowledge, one that will not quickly become antiquated with ever-changing technological trends.

Third, technological advances of the 21st century have brought us closer together and at the same time further apart. Advances to technology and infrastructure have made physical proximity optional, not only in education, but also in fields such as business and medicine, and they have made availability for interaction effortless. As a result of the increased opportunity for interaction across countries and around the world, teachers need to know how to foster cultural competence, emotional awareness, and leadership skills to facilitate not just interactions, but meaningful interactions and relationships.

D. Pre-service Teachers Education in Indonesia Context

To enroll oneself in a state university, Indonesian government through the Ministry of Research, Technology and Higher Education opens three entry schemes: national entrance test to state university (SNMPTN or Invitation track), joint selection entrance to state university (SBMPTN), and local entrance test (USM). Of total acceptance in a state university, sixty percent is allocated for those recruited through SNMPTN, twenty percent for SBMPTN, and another twenty percent for USM respectively [18]. This scheme is based on some considerations. First, more chance is given to students who have continuous and consistent achievement during their study in senior secondary school. It is believed that such a success is better than the one which is merely based on the result of the final test prior leaving the school. Second, more opportunity is also given to fresh graduates of the year to be accepted than those who graduated in the previous years. Third, to trigger more schools to have better accreditation status so that they will have more quotas of graduates accepted in state universities. As one of the ten faculties at the university, TEPIN does not recruit the students itself; rather the mother university does the recruitment. Once students are admitted, they will be sent to the faculty and majors they applied for based on their interest.

The curriculum of TEPIN has been developed based on the Indonesian National Qualification Framework (KKNI) as mandated in the Minister of National Education Regulations No 232/2000, No 45/U/2002, and Presidential Regulation No 8/2012 [19-21]. This curriculum has been developed to prepare the graduates to have professional competence in their majors, pedagogical competence in teaching, as well as personal competence and social competence as educators. Through this curriculum, from the commencement of their study, students have been introduced to professional duties of a teacher. The structure of the curriculum of TEPIN consists of a group of subjects: (1) subjects related to personal development (MPK), (2) subjects related to knowledge and skills (MKK), (3) subjects related to major study (MKB), (4) subjects related to attitude building (MPB), and (5) subjects related to community interaction (MBB). The total number of credits every student has to take is between 144-146 credits. MPK is offered from 6-8 credits, MKK 15-17 credits, MKB 96-99 credits, MPB 22-23 credits, and MBB 6 credits respectively.

In any civilization, including Indonesia, teachers' profession has a strategic value because teachers are responsible for a noble duty in the process of humanity, humanization, and the nation character building. This strategic value is accommodated in the acknowledgement of teachers' job as a profession. The issuance of Law No 14/2005 about teacher and lecturer legalizes teachers' job status as a profession [2].

A teacher is a professional educator whose primary task is to educate, teach, guide, direct, coach, assess, and evaluate students of formal education in early childhood education, primary education, and secondary education [3]. It is worth saying that teachers play a major role in the development of education. Teachers also determine the students' success, particularly in relation to teaching and learning. In addition, teachers have great influence in shaping the outcome of the education [22]. Therefore, any attempt made to improve the quality of education would not provide a meaningful contribution without the support of professional and qualified teachers.

In order to contribute to qualified education, teachers should meet the qualification prescribed. Qualified teachers are needed to maximize efficient role of education system and to improve the quality of students' learning. Qualified teachers are claimed to be those who can provide optimal learning outcomes for every learner in the classroom; an outcome considered central to national development [23]. In line with this, Indonesian government has stipulated the Decree of Ministry of Education and Culture No 16/2007 about the Academic Standard and Competency Qualification that teachers have to fulfill the standard of academic qualifications and competences [4].

Competence is an underlying characteristic of a person which enables him to deliver superior performance in a given job, role or situation [24]. In other words, competence means a skill and a standard of performance. Teacher competences have been investigated to increase the quality of teaching and teacher education. [25] reported that teacher competence correlated with the students' success.

According to Indonesian Government Regulation No 19/2005 about the Standard of National Education, teachers have to possess four basic competences, viz: professional competence, pedagogical competence, personal competence, and social competence. Professional competence is related to their mastery of the subject matter. Pedagogical competence is associated with their knowledge of instructional design and teaching practices. Personal competence is linked to the teachers' personality in carrying out their profession as teachers. Social competence is concerned with their ability to socialize with .

E. Pre-service Teachers Education in Sudan Context

TEPIS is one of the nineteen faculties the university has. This faculty has about 6,000 student bodies. This faculty applies single sex education, which means that male students are placed separately from female students in different buildings. It has 30 programs; 14 program

TEPIS is only responsible for educating and preparing pre-service teacher education, while in-service teacher education is handled directly by the government through the Ministry of

Education, Republic of Sudan. TEPIS runs four level of education: undergraduate (4 years), post-graduate diploma (1 year), master (by course and by research, 2 years), and Ph.D. (by research, 3-4 years) programs. For undergraduate degree, the curriculum covers national and local content consisting of 152-164 credits, which comprises into education subjects (54 credits), psychology subjects (62 credits), specialization subjects (30 credits), and university requirement subjects which is core subjects based on the national curriculum (24-26 credits) covering religion, Arabic language, English, computer, and Sudanese history subjects.

The recruitment of the students (pre-service teachers) in the TEPIS is done through a national test covering general subject, English, and Arabic, and an interview. They are prepared for teachers of primary and secondary schools. Those who want to be teachers at Secondary Vocational Schools, they have to take another two years education after they graduate from the undergraduate degree. For those who want to be teachers of kindergarten, they are only required to pass Diploma 2 program, not an undergraduate degree.

III. METHODOLOGY

This is a comparative study. It compared the implementation of pre-service teacher training in TEPIN and TEPIS in preparing pre-service teachers for the 21st century education. The study was conducted from May to November in 2018 both in Palembang, Indonesia and in Khartoum, Sudan. The data were obtained through documentation, survey, and interview. Documentation was related to the regulations applied in the two teacher education programs and all the related documents of the implementation of pre-service teacher education.

Survey was conducted to 200 samples of the study. One hundred samples from the TEPIS and 100 samples from the TEPIN responded to the questionnaire. They questionnaire which was used entitles A Survey for Measuring 21st Century Teaching and Learning: West Virginia 21st Century Teaching and Learning Survey [WVDE-CIS-28]. It was adopted from the already made one developed by [26]. The questionnaire consists of 34 items with five responses. It has four constructs, viz: Critical Thinking skills, Collaboration skill, Communication skill, and Creativity and Innovation skill. It also has very good reliability (extremely reliable overall measures for each skill (standardized alpha > .90, inter-item correlations > .58). Since the questionnaire is valid and reliable, there was no need to pilot it to the sample anymore.

Interviews were conducted to the lecturers as well as the management of the two teacher education programs. The interview was given to 4 lecturers/head of departments representing 4 departments from the TEPIN and 4 lecturers/head of departments representing 4 departments from the TEPIS. The data obtained were analyzed quantitatively and qualitatively. Quantitative data obtained from the survey were analyzed using percentage (see Table 2, 3, 4, and 5), while qualitative data from documentation were analyzed as they were and the interview were analyzed based on thematic analysis through coding process.

A. Results and Discussion

The results of the study are presented following the sequence of research objectives as stated previously. The results from the documentation are presented first which then follows by the results from questionnaire and interview respectively.

B. Results from the Documentation

Results obtained from documentation were related to research objectives 1 and 2. Related to objective 1, it was found that students were recruited based on four aspects: (1) minimum qualification required, (2) recruitment process, (3) entrance test, and (4) terms and conditions of acceptance.

Both TEPIN and TEPIS apply different minimum qualification required for a student to be accepted. At the TEPIN, a high school graduate or equivalent (SMA/SMK/MAN/ other) is eligible to enrol as a student (pre-service teacher candidate) as long as he or she passes the entry test. Then he or she is required to have one year teacher education program to be certified as a professional pre-service teacher. On the other hand, at Omdurman Islamic University, a high school graduate or equivalent can enrol as a student (pre-service teacher candidate). There is no requirement for him or her to take one year teacher education program to be certified as a professional pre-service teacher in Sudan. However, if he or she wants to be a teacher at a secondary vocational school, he or she has to take two years vocational education program. In relation to the recruitment process, there are three lines on recruitment applied for undergraduate degree at the TEPIN, namely (1) national entrance test to state university (SNMPTN or Invitation track), (2) joint selection entrance to state university (SBMPTN), and (3) local entrance test (USM). After that an Undergraduate alumni has to take a written test and an interview to pass the one-year teacher education program; whereas TEPIS only applies one line of recruitment, that is a national entrance test and an interview. Regarding the entrance test of the undergraduate degree, TEPIN requires every candidate to take a written test consisting of mathematics, science or social, English, Indonesian language, and aptitude test. In addition, a performance test is compulsory if a candidate choses a major which requires him or her to have performance skill such as the one who chooses to study physical education discipline. Once they graduate and continue to one-year teacher education program, they have to pass a national test and an interview, as well. However, TEPIS requires every candidate to take a written test covering general knowledge, Arabic language, and English plus an interview. Specific terms and conditions are applied in recruiting prospective students at the two faculties. Every candidate can apply to study at TEPIN only if he or she graduates from high school within two years, on the other hand there is no such prerequisite applied at TEPIS.

Once the students are admitted in the TEPIN, a series of process related to the following aspects: (1) period of study, (2) number of credits required, (3) kind of curriculum applied, (4) level of curriculum, (5) lecturer qualification, (6) student grade point average, and (7) grading system of subjects, is implemented.

A student of TEPIN is required to finish his or her study within the period of 4 to 5 years (8-10 semesters). It is possible if a student is able to finish his or her study less than 4 years (around 7 semesters) but it is not possible to finish more than 10 semesters. If a student could not finish his or her study during 5 years, he or she will drop out from this teacher education program. After a student graduated from this Undergraduate degree, he has to take one-year teacher education program to take professional status. Different length of study is needed at the TEPIS. A student is given only four years to complete his or her study. There is also different number of credits a student requires to take at the two faculties. At TEPIN, a student needs to complete 140-144 credits during his or her candidature. It means that he or she has to attend 48 hours meeting a week. In the one-year teacher education program, a student is required to finish another 32 credits. At the TEPIS, a student has to take 160 credits during four year study or 40 hours meeting a week. This number is about the same compared to the number of hours a student has to take at TEPIN. However, this is reasonable considering different year span of the two places of study.

Concerning the curriculum applied, TEPIN applies the Indonesian National Qualification Framework (KKNI) as mandated in the Minister of National Education Regulations No 232/2000, No 45/U/2002, and Presidential Regulation No 8/2012 [19-21]. This curriculum has been developed to prepare the graduates to have professional competence in their majors, pedagogical competence in teaching, as well as personal competence and social competence as educators. Through this curriculum, from the commencement of their study, students have been introduced to professional duties of a teacher. TEPIS curriculum also focuses on the professional and pedagogical competence of the prospective teacher as well. Regarding the level of curriculum, TEPIN combines both national and local (institution-based) content. Eighty percent of the curriculum is devoted to local content and the other twenty percent is for the national content. TEPIS also accommodates local and national contents in its curriculum. More percentage is allocated for the national content (76%) than the local content (24%).

In relation to the lecturers' qualification, both TEPIN and TEPIS prefer doctorate degree holders to teach at the teacher education program although those who have master's degree

qualification are still allowed to teach at the undergraduate program. Not only lecturers have such a rule, students also have to fulfil required achievement in order to complete their study. At the TEPIN, a student has to have at least 2.00 great point average (GPA, in the scale of 0-4) in order to complete his or her study. The same terms and conditions also apply to TEPIS. Similarly, grading system of subjects uses the scale E to A at both faculties.

In relation to research objective 2, students were trained to be teachers at different level of schools, ranging from primary to secondary education. It is found that once the students graduated from the TEPIN, they are not eligible to teach at the primary education (kindergarten and primary school) and secondary education (junior and senior high school as well as vocational school) until they graduated from one-year teacher education program. This is in line with Law No 20/2003 about the System of National Education, Law No 14/2005 about Teacher and Lecturer, and Government Regulation No 19/2005 about National Education Standard, Ministry of National Education Regulation No8/2009 about Pre-service Teacher Profession Education Program, Ministry of National Education Regulation No 9/2010 about In-service Teacher Profession Education Program, and Ministry of National Education Regulation No8/2009 about Pre-service Teacher Profession Education Program Jo Ministry of Education and Culture Regulation No 87/2013 about Pre-service Teacher Profession Education Program [1-2, 27-29].

These law and regulation stipulate that teacher has to have at least undergraduate degree or diploma IV academic qualification in order to teach at primary and secondary education plus professional education which is implemented in one-year teacher education program. The graduate is illegible to teach only a subject that is in line with his or her major such as a subject teacher is only allowed to teach the subject of his major either in junior high school, senior high school or senior vocational school, while a class teacher is only permitted to teach at primary school. All of these are meant to empower teachers according to their competence and to maintain the quality of Indonesian education. Similarly, TEPIS also prepares the graduates to teach at both primary and secondary education. The answer of research questions 1 and 2 can be summarized in Table 1 below.

TABLE I.   SUMMARY OF THE DATA FROM DOCUMENTATION

Questions Coverage	Teacher Education Institution	
I. Prerequisites	*TEPIN*	*TEPIS*
1. Requirements needed to be a teacher of:		
a. Kindergarten	Undergrad. Plus	Undergrad.
b. Primary School	Undergrad. Plus	Undergrad.
c. Junior Secondary School	Undergrad. Plus	Undergrad.
d. Senior Secondary School	Undergrad. Plus	Undergrad.
e. Vocational School	Undergrad. Plus	Undergrad.
II. Recruitment		
1. Minimum qualification required to become a student at the teacher education program	High school grad	High school grad
2. Recruitment process	Test	Test & Interview
3. Kind of entrance test	Major/Psychology	Major, English, Arabic
4. Terms and condition of acceptance	Passing grade	Passing grade
III. Training/Educating Program		

1. Period of study	4 years plus 1 year	4 years
2. Number of credits required	144 + 32	160
3. Kind of curriculum applied	Consecutive	Consecutive
4. Standardization	KKNI	National and local
5. Level of curriculum	National and local	National and local
6. Lecturer qualification	S2/S3	S2/S3
7. Student grade point average	2.00	2.00
8. Grading system of subjects	Test & project	Assignment & Test
IV. Eligibility of teaching		
Undergraduate holder	Primary & Secondary	Primary & General Secondary (not vocational school)

C. Results from the Questionnaire

The construct of the questionnaire items are grouped based on typical characteristics of 21st century learning which put focus on the metacognitive knowledge—critical thinking skill, collaboration skill, communication skill, and creativity and innovation skill, which is known as C4. Therefore, the presentation of research objective 4 also follows that classification. In order to see the respondents' responses from the two programs, the data are placed one after the other to make it easy to compare.

TABLE II. TEACHING PRACTICES THAT SUPPORT STUDENTS' CRITICAL THINKING SKILL

TEPIN					
In your teaching of your TARGET CLASS, how often have you asked students to do the following:	*AN*	*AFT AS*	*1-3 TPM*	*1-3 TPW*	*AD*
Compare information from different sources before completing a task or assignment?	0	30	31	35	4
Draw their own conclusions based on analysis of numbers, facts, or relevant information?	1	20	35	26	18
Summarize or create their own interpretation of what they have read or been taught?	0	21	40	29	10
Analyze competing arguments, perspectives or solutions to a problem?	1	20	30	35	14
Develop a persuasive argument based on supporting evidence or reasoning?	1	23	31	33	12
Try to solve complex problems or answer questions that have no single correct solution or answer?	0	23	26	31	20
To what extent do you agree with these statements about your TARGET CLASS?	*NR*	*TA ME*	*TA ME*	*TA GE*	*TAV GE*
I have tried to develop students' critical thinking skills	21	11	39	26	3
Most students have learned critical thinking skills while in my class	19	16	41	24	0
I have been able to effectively assess students' critical thinking skills	17	16	39	27	1
TEPIS					
In your teaching of your TARGET CLASS, how often have you asked students to do the following:	*AN*	*AFT AS*	*1-3 TPM*	*1-3 TPW*	*AD*
Compare information from different sources before completing a task or assignment?	2	36	24	1	37
Draw their own conclusions based on analysis of numbers, facts, or relevant information?	2	26	33	14	25
Summarize or create their own interpretation of what they have read or been taught?	0	9	30	6	55
Analyze competing arguments, perspectives or solutions to a problem?	0	16	36	19	29
Develop a persuasive argument based on supporting evidence or reasoning?	0	21	23	27	29
Try to solve complex problems or answer questions that have no single correct solution or answer?	0	9	20	27	44
To what extent do you agree with these statements about your TARGET CLASS?	*NR*	*TA ME*	*TA ME*	*TA GE*	*TAV GE*
I have tried to develop students' critical thinking skills	0	10	12	40	38
Most students have learned critical thinking skills while in my class	0	21	34	31	14
I have been able to effectively assess students' critical thinking skills	0	2	37	10	51

Note:

AN: Almost Never, AFTS: A few times a semester, 1-3 TPM: 1-3 times per month, 1-3 TPW: 1-3 times per week, AD: Almost daily

NR: Not really, TAME: To a minor extent, TAME: To a moderate extent, TAGE: To a great extent, TAVGE: To a very great extent

Based on the data presented in Table 2, it can be seen that both TEPIN and TEPIS lecturers have applied critical thinking skill in their classes during teaching and learning process. When both responses are compared, TEPIN lecturers were slightly more frequent (79.9%) in asking students to do critical thinking skills compared to TEPIS lecturers (75.43%) (See items 1-6), whereas TEPIS lecturers perceived their effort more positively (89.1%) in asking students to do critical thinking skills compared to TEPIN lecturers (66.66%) (See items 7-9).

TABLE III. TEACHING PRACTICES THAT SUPPORT STUDENTS' COLLABORATION SKILL

TEPIN					
In your teaching of your TARGET CLASS, how often have you asked students to do the following:	AN	AFT AS	1-3 TPM	1-3 TPW	AD
Work in pairs or small groups to complete a task together?	0	14	32	33	21
Work with other students to set goals and create a plan for their team?	4	20	33	34	9
Create joint products using contributions from each student?	7	31	26	30	6
Present their group work to the class, teacher or others?	3	17	30	36	14
Work as a team to incorporate feedback on group tasks or products?	3	32	29	27	9
Give feedback to peers or assess other students' work	1	24	32	32	11
To what extent do you agree with these statements about your TARGET CLASS?	NR	TA ME	TA ME	TA GE	TAV GE
I have tried to develop students' collaboration skills	13	17	42	27	1
Most students have learned collaboration skills while in my class	10	20	42	27	1
I have been able to effectively assess students' collaboration skills	13	20	40	26	1

TEPIS					
In your teaching of your TARGET CLASS, how often have you asked students to do the following:	AN	AFT AS	1-3 TPM	1-3 TPW	AD
Work in pairs or small groups to complete a task together?	2	15	17	50	16
Work with other students to set goals and create a plan for their team?	3	30	38	26	3
Create joint products using contributions from each student?	3	17	49	22	9
Present their group work to the class, teacher or others?	3	32	15	41	10
Work as a team to incorporate feedback on group tasks or products?	0	43	8	27	22
Give feedback to peers or assess other students' work	0	37	22	29	12
To what extent do you agree with these statements about your TARGET CLASS?	NR	TA ME	TA ME	TA GE	TAV GE
I have tried to develop students' collaboration skills	0	2	17	22	59
Most students have learned collaboration skills while in my class	0	6	39	38	17
I have been able to effectively assess students' collaboration skills	0	6	34	7	53

Based on the data presented in Table 3, it can be seen that both TEPIN and TEPIS lecturers have applied collaboration skill in their classes during teaching and learning process. When both responses are compared, TEPIN lecturers were slightly more frequent (75.36%) in asking students to do collaboration skills compared to TEPIS lecturers (69.03%) (See items 10-15), whereas TEPIS lecturers perceived their effort more positively (95.65%) in asking students to do collaboration skills compared to TEPIN lecturers (69.05%) (See items 16-18).

TABLE IV. TEACHING PRACTICES THAT SUPPORT STUDENTS' COMMUNICATION SKILL

TEPIN					
In your teaching of your TARGET CLASS, how often have you asked students to do the following:	AN	AFT AS	1-3 TPM	1-3 TPW	AD
Structure data for use in written products or oral presentations (e.g., creating charts, tables or graphs)?	6	29	33	25	7
Convey their ideas using media other than a written paper (e.g., posters, video, blogs, etc.)	6	37	23	24	10
Prepare and deliver an oral presentation to the teacher or others?	3	29	31	27	10
Answer questions in front of an audience?	7	19	27	26	21
Decide how they will present their work or demonstrate their learning?	1	23	40	23	13
To what extent do you agree with these statements about your TARGET CLASS?	NR	TA ME	TA ME	TA GE	TAV GE
I have tried to develop students' communication skills	16	10	41	26	7
Most students have learned communication skills while in my class	13	15	44	24	4
I have been able to effectively assess students' communication skills	14	17	36	27	6

TEPIS					
In your teaching of your TARGET CLASS, how often have you asked students to do the following:	AN	AFT AS	1-3 TPM	1-3 TPW	AD
Structure data for use in written products or oral presentations (e.g., creating charts, tables or graphs)?	9	10	32	41	8
Convey their ideas using media other than a written paper (e.g., posters, video, blogs, etc.)	14	62	21	3	0
Prepare and deliver an oral presentation to the teacher or others?	3	45	21	21	10
Answer questions in front of an audience?	0	14	24	28	34
Decide how they will present their work or demonstrate their learning?	0	20	44	27	9
To what extent do you agree with these statements about your TARGET CLASS?	NR	TA ME	TA ME	TA GE	TAV GE
I have tried to develop students' communication skills	0	6	15	14	65
Most students have learned communication skills while in my class	0	17	29	25	29
I have been able to effectively assess students' communication skills	0	10	18	16	56

Based on the data presented in Table 4, it can be seen that both TEPIN and TEPIS lecturers have applied communication skill in their classes during teaching and learning process. When both responses are compared, TEPIN lecturers were slightly more frequent (72.51%) in asking students to do communication skills compared to TEPIS lecturers (64.57%) (See items 19-23), whereas TEPIS lecturers perceived their effort more positively (89.49%) in asking students to do collaboration skills compared to TEPIN lecturers (71.90%) (See items 24-26).

TABLE V. TEACHING PRACTICES THAT SUPPORT STUDENTS' CREATIVITY & INNOVATION SKILL

TEPIN

In your teaching of your TARGET CLASS, how often have you asked students to do the following:	AN	AFT AS	1-3 TPM	1-3 TPW	AD
Use idea creation techniques such as brainstorming or concept mapping?	3	31	29	30	7
Generate their own ideas about how to confront a problem or question?	0	26	31	34	9
Test out different ideas and work to improve them?	3	25	34	31	7
Invent a solution to a complex, open-ended question or problem?	3	23	29	40	5
Create an original product or performance to express their ideas?					
To what extent do you agree with these statements about your TARGET CLASS?	NR	TA ME	TA ME	TA GE	TAV GE
I have tried to develop students' creativity and innovation skills	13	21	33	29	4
Most students have learned creativity and innovation skills while in my class	12	30	31	23	4
I have been able to effectively assess students' creativity and innovation skills	16	20	41	23	0

TEPIS

In your teaching of your TARGET CLASS, how often have you asked students to do the following:	AN	AFT AS	1-3 TPM	1-3 TPW	AD
Use idea creation techniques such as brainstorming or concept mapping?	4	11	46	34	5
Generate their own ideas about how to confront a problem or question?	1	17	10	53	19
Test out different ideas and work to improve them?	0	17	7	35	41
Invent a solution to a complex, open-ended question or problem?	1	14	13	56	16
Create an original product or performance to express their ideas?	1	2	25	16	56
To what extent do you agree with these statements about your TARGET CLASS?	NR	TA ME	TA ME	TA GE	TAV GE
I have tried to develop students' creativity and innovation skills	1	11	17	7	64
Most students have learned creativity and innovation skills while in my class	1	9	26	27	37
I have been able to effectively assess students' creativity and innovation skills	1	2	2	35	60

Based on the data presented in Table 5, it can be seen that both TEPIN and TEPIS lecturers have applied creativity and innovation skills in their classes during teaching and learning process. When both responses are compared, TEPIS lecturers were more frequent (86.09%) in asking students to do creativity and innovation skills compared to TEPIN lecturers (68.28%) (See items 27-31) and also perceived their effort more positively (91.67%) in asking students to do creativity and innovation skills compared to TEPIN lecturers (62.86%) (See items 32-34).

IV. RESULTS FROM THE INTERVIEW

Related to research objectives 3, 5, 6, 7, and 8, semi-structured interviews were conducted to eight respondents from both institutions. In relation to research objective 3, it was found that basically the two institution TEPIN and TEPIS have accommodated two kinds of knowledge based on [13] framework of 21st education into their curriculum foundation knowledge and humanistic knowledge, whereas both institutions vary in their response to metacognitive knowledge. TEPIN has put the metacognitive knowledge to a certain extent in its curriculum, while TEPIS has not, as indicated in the following interview excerpt.

To a considerable degree, the curriculum covers those kinds knowledge, not as excellent as it should be but most of them are covered. Yes I do care about those three kinds of knowledge … I do care about metacognitive knowledge; I apply them the subject I teach…English, my specialization. Other subject, I can't tell whether other lecturers apply this or not. Considering me as an English teacher I try to cover most of this… (Participant 3)

… to a certain extent, I think those three kinds of knowledge have been taught, although not total… such as critical thinking, problem solving, Some has been directed into … Then, there have been many teaching and learning processes making use of ICT, and there are some subjects that require students to do practicum, such as Multimedia, Computer in Teaching and Learning for critical thinking; Entrepreneurship for Innovation skill, Assessment in Education for problem solving. So, those skills are introduced to prepare students to such skills; for collaboration, it is implemented in teaching and learning process… (Participant 6)

The above quotes reveal that the two institutions have accommodated both foundation and humanistic knowledge in their curriculum in terms of subjects that students need to take. Both TEPIN and TEPIS believe that foundation and humanistic knowledge are essential for pre-service teachers since they are core content that teachers must have, as reported by Participants 3 and 6. However, in responding to the need of metacognitive knowledge, they give different treatment. TEPIN has allocated metacognitive knowledge a space into

some subjects such as Entrepreneurship, Assessment in Education, etc., while in TEPIS such knowledge is not allocated in the subjects offered to the students. Nevertheless, some lecturers included metacognitive knowledge as part of teaching strategy and activities they apply in the subjects that they teach.

In addition to the results of research objective 4 obtained from the questionnaire above, based on the results of the interview, it was also found that lecturers perceived positively the 21st century education framework. They realized that to live in the Methode 21st century requires someone to have life skills that are needed to survive in. They reported that by introducing students the 21st century life skills and making them master those skills, students are expected to be able to respond to the demand of the 21st century living. Their belief is in line with what [30] argues, "Today, much success lies in being able to communicate, share, and use information to solve complex problems, in being able to adapt and innovate in response to new demands and changing circumstances, in being able to command and expand the power of technology to create new knowledge." This response accords with the results of the data from questionnaire presented in Table 2 to 5 previously where lecturers from the two institutions perceive positively the implementation of 21st century learning. Such responses are reflected from the interview quotes below.

I agree with this 21st century framework. If students are taught with this concept, we will have very good teachers later. They do not possess foundational and humanistic knowledge only but also metacognitive knowledge… which is necessary for 21st century learning. I think every head of departments and lecturers should support this need… (Participant 1)

Absolutely agree… actually these 21st century life skills have been taught in our faculty… Such skills as critical thinking, collaboration, ICT literacy have been applied in some subjects. There are some subjects which require lecturers to implement such skills… If we think of future education, we need to adjust ourselves because 21st century learning is brought into that direction… (Participant 6)

The above interview excerpts indicate that both lecturers at TEPIN and TEPIS share similar views toward the need for 21st century learning framework. They agree that students should be equipped with 21st century life skills so that they could survive living in the 21st century successfully.

When further examined, the results research objective 5, teacher educators (lecturers) had various responses to the 21st century education, as indicated below.

… I think lecturers should be broad minded … they need to look from different angle … Lecturers need to be creative… the curriculum needs to accommodate recent demand ... the 21st century learning… To this extent, I think we need to develop the curriculum covering metacognitive knowledge which characterizes the 21st century education… I myself am trying to adjust myself with the 21st century learning (Participant 2)

Even I am afraid of how it can be applied in the circumstance in which we teach especially in our universities… with limited facilities, I believe 21st century learning is demanding, especially applying metacognitive knowledge where students need to be able to master such skills as critical thinking, collaboration… I have tried, I may have applied some of the aspects what you have mentioned. I think I will widen my view and try to apply more… (Participant 3)

… it needs to be supported with reliable facilities… I think our institution has made some efforts to provide support as demanded by 21st century learning; of course that needs to be optimized. For me, I am doing my best effort… I try to do what I can do such as trying to implement metacognitive knowledge in the subjects I teach… (Participant 5)

The quotes above reveal that those lecturers responded differently to the issue of 21st century learning. They suggested that in order to accommodate 21st century learning the current curriculum needed to be adjusted and the facilities needed to be updated. However, they had one thing in common, that is, they tried to adjust themselves with such a demand of 21st century learning. They realized that they cannot get rid of the change; they needed to adjust themselves so that they would not be left behind in preparing the pre-service teachers of the 21st century. This is in line with what Larson and Miller (2012, p. 123) argued that educators have to be responsive in preparing their students in a rapidly changing world.

In relation to the research objective 6, two themes emerged from the findings related to the two programs response to the quality assurance and accreditation as the requirement of sustainable development of the 21st century education: quality assurance provision and accreditation standard fulfilment. The following are quotes from respondents of the interview.

As far as I know, our university has a unit for quality assurance and a team who is responsible for it. It has a responsibility of maintaining the quality of every program regularly… and about accreditation; of course the faculty has tried to meet the standard prescribed in the accreditation process (Participant 2)

In my university, there is an institute whose function is as the quality assurance responsible for managing the quality assurance of all faculties. Even in each faculty, including the faculty of teacher training and education, a quality assurance unit is also provided. This unit is responsible for managing and controlling the implementation of teaching and learning activities in every study program … About accreditation, certainly, every study program needs to be accredited by the National Accreditation Board, Ministry of Research, Technology, and Higher Education. Each study program undergoes accreditation process every five years (Participant 8)

Learning from the above quotes, it can be said that both institutions respond to the quality assurance and accreditation as the requirement of sustainable development of the 21st century education. They cannot ignore the prerequisite of maintaining the quality assurance and accreditation of the institution as required by the Ministry of Education.

Concerning with research objective 7, the two faculties experienced two challenges—students mindset change and life skills-oriented subject—in preparing pre-service teacher for the 21st century education, as shown in the following interview excerpt.

Applying 21st century learning needs students' readiness to study collaboratively, able to communicate correctly, able to solve problems faced, be innovative, etc… and it needs extra effort from lecturers to change students' mindset from passive learning to active learning so that they will be more responsive towards 21st century life demand. Besides, staff mindset also needs to change from watching to doing. They need to provide optimal supports for 21st century learning. In this case, lecturers have to be creative and administrators have to be supportive... (Participant 7)

Although students are taught and prepared to be prospective teachers, I think, it is necessary to offer subjects which are not directly related to their future profession as teachers, for example offering subjects related to other possible professions such as journalist, master of ceremony, writer, etc. Certainly this needs to be anticipated by providing content-related subjects in the curriculum. Besides, since the development of ICT is very fast, it is necessary to offer character education in order to filter information (Participant 5)

The above quotes indicate that so far students were not ready yet in responding to 21st century learning. It was due to their habit in maintaining passive learning. They preferred to be spoon-fed rather than proactive in searching for the information needed. Lecturers were not different, especially the older ones. They were simply not motivated in to be more active in responding to 21st century education demand. They preferred teaching in their old ways such as lecturing and doing knowledge direct transfer to the students without involving students to find the answer of what they were learning by themselves. In meeting this challenge, the paradigm of teaching should be shifted from transferring knowledge to facilitating knowledge searching; at the same time students should also change their mindset from passive to active learners, as advised by [31], "Educational attention has turned away from the teacher dispensing knowledge to the students generating the knowledge and the teacher serving as a guide". Supporting staff such as administrators, labour men were not very much different. They were less responsive to the students and lecturers' needs in applying 21st century education. In this case, they need to provide professional development in terms of skill-specific training [32] in order to support pre-service teachers experience 21st century learning. Offering content-related subjects to other possible related professions in the curriculum are also necessary since the graduates might choose other professions to live in. This cannot be ignored because 21st century life might provide different vacancy from what they are expecting. In short, to meet these challenges teacher education programs must be transformed in ways that will enable pre-service teachers to acquire the 21st century skills they will need to be successful in work and life [30].

With regard to research objective 8, the two programs encountered three major problems—big class, limited facilities, and ICT-unskillful staff—in preparing pre-service teacher for the 21st century education, as indicated in the quotes below.

Here in Omdurman, the classes are very crowded with students… there are about 250 to 300 students in a class… very big number of students in a class! If you come here in October you can see the class, big class, some students sit outside the class windows. It's really not easy to manage… (Participant 1)

Facilities have been problems besides overcrowding of students… updating of lecturers competence also one of it. Now the university is starting to solve these problems. We hope that they will fix them soon (Participant 3)

At Sriwijaya University, one of the core problems to support 21st century learning is the availability of human resources in the faculty and university. Their ability in using ICT facilities is not there yet. This is ironic; if the facilities are okay but the human resources are not skilful, then the facilities cannot be used optimally… you know, there are two kinds of capacity, plugged capacity and utilized capacity. If the plugged capacity is there but the utilized capacity is not, then it is no use… So, both of capacities have to be there… (Participant 6)

I think every aspect has possible problem, let alone the lecturers, staff, and students. Besides, facilities are not sufficient… control from the authority also needs to be strengthened… (Participant 7)

Certainly, there is no organization without problem, including the implementation of teacher education at the TEPIS and TEPIN. In relation to the 21st century learning, the former encounters persistent problems related to big classes, limited facilities, and lecturers ICT literacy, while the latter needs support from ICT-literate human resources (lecturers and staff) and control from the authority in program implementation. Solution to these problems is certainly needed in order that the implementation of 21st learning can be successfully reached

V. CONCLUSION

The results of this study can be concluded as follows. First, both TEPIN and TEPIS pre-service teachers were recruited based on four aspects: minimum qualification required, recruitment process, entrance test, and terms and conditions of acceptance. Second, both TEPIN and TEPIS pre-service teachers were trained to be teachers of primary and secondary schools. Third, basically both TEPIN and TEPIS taught foundation knowledge and humanistic knowledge to a great extent, whereas they varied in their response to metacognitive knowledge. Fourth, teacher educators at both TEPIN and TEPIS perceived positively the 21st century education framework. Fifth, teacher educators of both TEPIN and TEPIS had various responses to the 21st century education, such as adjustment to current curriculum is needed and facilities need to be updated. However, they agreed that they need to adjust themselves with the demand of 21st century learning. Sixth,

both TEPIN and TEPIS need to respond to quality assurance provision and accreditation standard fulfilment for sustainable development of the 21st century education. Seventh, both TEPIN and TEPIS experienced two challenges students' mindset change and life skills oriented subject in preparing pre-service teacher for the 21st century education. Finally, TEPIS encountered problems such as big class, limited facilities, and ICT unskilfull staff, while TEPIN had problem in ICT unskilfull staff in preparing pre-service teacher for the 21st century education.

In response to the above conclusion, some suggestions are offered. First, TEPIS needs to restructure class into small class with small number of students in a class. Second, lecturers need to give opportunities for professional developments so that they are updated with current education trend of 21st century learning. Third, TEPIN needs to upgrade the ICT-related facilities, especially the internet capacity to support 21st century learning. Fourth, provision of technical assistance on 21st education for lecturers and staff of the TEPIN needs to do, especially on the application of the metacognitive knowledge. Finally, regular management control on the implementation of 21st century learning needs to be strengthen.

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