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Preliminary Analysis of Assessment Instrument Design to Reveal Science Generic Skill and Chemistry Literacy

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ABSTRACT

The purpose of this research is to design assessment instrument to evaluate science generic skill (SGS) achievement and chemistry literacy in ethnoscience-integrated chemistry learning. The steps of tool designing refers to Plomp models including 1) Investigation Phase (Prelimenary Investigation); 2) Designing Phase (Design); 3) Construction/Realization Phase (Realization/Construction); 4) Test, Evaluation and Revision Phase. (Test, Evaluation and Revision). To test the validity of assessment instrument, it was used content validity by three experts as validators, while to test the practical, it was used questionnaire which were given to 22 college students of food ingredients chemistry that is integrated of ethno-science and two supporting lecturers. The result of content validity showed that assessment tool which was developed was valid stated by experts with the reliability coefficient was 0.72. Every lecturers and 21 students gave positive response, so it can be concluded that developed assessment instrument was practice to use.

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1. INTRODUCTION

Chemistry educators, scientist, and policy makers agree that student chemistry literacy development as students' skill in using chemistry concept to be applied in daily life, to explain scientific phenomena and also to visualize that phenomena based on scientific facts [1]-[5] are important purpose of chemistry/science learning [6]. On the other hand, in recent research it was showed that more than 150 life sciences faculty from many institue stated that generic skills like problem identifications skills, spoken and written communication skills, also skills to interprete data as three important skills that had to be developed before students's graduation lulu [7]. The importance of SGS in science learning is also admitted by previous researcher [8]-[11]. However, like in chemistry literacy skills, this generic skill evaluation needs assessment instrument construction as intergracy parts of an assessment process in learning to get information of students' learning result (observation, levels, testing using pencil and paper) and to make assessment of learning process [12],[13].

The importance of assessment instrument design that can assess SGS and chemistry literacy is based on the fact that the achievement of chemistry learning that actually needs assessment instrument which is not only including comprehension and memorization, but also to assess whether or not the students are able to applied the concept they learnt when they are facing a problem. The example of many science/chemistry literacy assessments had been developed in science learning which were done by PISA (Programme for International Student Assessment) and TIMSS (Trend in Mathematics and science studies). TIMSS assessed what had been taught to the student while PISA assessment was more stressed on how students use or apply science/chemistry concepts they learnt in daily life application [2]. PISA assessment not only measured students' knowledge, but also measured science process skills and students' attitude towards science [3].

The result of previous introduction study towards assessment tool on food ingredients chemistry learning that was available in three LPTK in Central Java, it was obtained following result. First, most of the questions constructed by lecturers only suppressed on students' conceptual knowledge aspects, this statement is appropriate to the one stated by [14]-[17]. Second, assessment to evaluate science/chemistry literacy skills like was defined by NRC Standard [18] that includes conceptual comprehension, also perception of science and society [19]is not available. Third, it was found that some questions not only suppressed on knowledge aspects but also assessed thinking skill aspect. However, there was none of them that reveal generic skill and students' chemistry literacy skill of science process aspect. Fourth, there is no construction of assessment instrument that can be used to assess SGS and chemistry literacy, even though assessment instrument that based on science generic skill have been developed by some researchers [9],[10],[20], thus assessment tool of chemistry literacy [6],[21]. This discovery on initial study is appropriate to the one stated by [22] that some of learning in college drive the purpose of the learning on only cognitive skill, while other aspect like psychomotor, affective, including generic skill sometimes are forgotten. These conditions actually affect the lack of learning result and the low qualification of students' life to live in society.

According [23] in his study stated following statement: 1) chemistry science application in daily life is lack of teachers' attention in class, so it needs to give a solution which is to develop chemistry science literacy assessment with contextual approach, 2) chemistry science literacy assessment tool have characteristic that can discriminate student with high and low category well. The interview result with those three LPTK food ingredients chemistry lecturers, one of the reasons why assessment instrument that was used had never revealed SGS and chemistry literacy, lecturers together stated that it was because there has not been assessment instrument for those two things. Thus, the thing that should be solved soon is the availability of assessment tool that can be reliable to measure concept comprehension also can be used to measure SGS and chemistry literacy.

Generally, the result of development of various instrument to assess science/chemistry literacy are focus on one of the following things:

1. Measuring comprehension of the science/chemistry result in the school. Knowledge/content aspects usually are considered important to science/chemistry literacy, thus, these are the most aspect that are measured by teacher and science/chemistry educators.
2. Measuring skill for applying scientific principles in non-academic contexts, one of them is cultural aspect. The main characteristic of that tool is by designing authentic assignment (like observing, reading information/ doing observation about ethno-science).
3. Measuring literacy skill in scientific context that is doing evaluation individual skills in reading, writing, telling reason, and asking further information [24]. Some examples of this approach measure skills using scientific research report [25].
4. Measuring comprehension about nature of science (NOS), and comprehension of students' knowledge and attitude towards the topic related to Science Technology Society (STS). For example Views of Science Technology and Society (VOSTS) instrument which were developed and validated by Aikenhead and Ryan on 1992.

For further analysis, the fourth focus of science/chemistry literacy assessment above are appropriate to many aspects of SGS, like content aspect that is appropriate to symbolic language, principle obedient logical framework, the relation between cause and effect and logical inference, authentic assignments based on observation and modeling aspects. From the science/chemistry literacy assessment, for example the evaluation of chemistry literacy comprehension on knowledge/conceptual aspect, can be consist of some generic competences. Such as on different chemistry literacy aspects can be used to assess the same generic competence. Nature of Science (NOS) based on science context. From this statement, it is possible to arrange assessment tool that can be used to assess chemistry literacy skills about content, process, context and also SGS measuring.

Experts state that curriculum is needed to raise *indigenous science* in science learning, different from nowadays that commonly done in many school learning which override original science that existed and spread in society life. Efforts to integrate indigenous science/ethno-science into science learning curriculum in the school actually has been suggested and teacher need to think twice on how the students' learning result can be useful and meaningful [26]. In ethno-science based learning, concepts, principles, and materials in science are learnt by the students by contradicting the contextual problems (phenomena) which are real life problems or at least from the visualized problems as real problems. According to [27], school learning that is appropriate to 21^{st} century is ethno-science approached science learning or multicultural science approach. Same issue and suggestion was also stated by [28] when exploring the contributions of cultural competence in learning context in university. Explicitly, [28] asked for the science learning system in school to be changed by paying attention to culture (indigenous science) that is spreading in society and give recommendation of science curriculum production that accommodates indigenous science into formal school learning. [28] especially push the science teachers to put example of society science in their learning and also to teach the students to be aware that knowledge is a part of every culture in the world.

The combining indigenous science (socio-culture science) and science learning in school actually can increase students' learning achievement and to make students' learning process be effective [29]. Michell (2008) in[30] found that science learning curriculum that is developed in local culture increase strong nationalism. Students' understanding that based on culture in their society takes part in interpreting and absorbing new knowledge (science concepts) [31]. The students' cultural background have bigger effect in education process if that is put in learning process in the class [29]. Students cultural background have strong effect on the way someone (students) learns, because students have spent their times in the middle of the environment that is made/influence by society culture than formal education theories [31],[32]-[36]. According [37], cultural background that is brought by teachers and students in the class (especially in science learning) take a big part of making or conditioning learning atmosphere that meaningful and contextual.

From the existing problems and experts' opinion above, it is need assessment tool to know the achievement level of learning purposes and see the effectiveness of learning process in the context of local wisdom [38][39]to assess the achievement of science generic skill and chemistry literacy beside the concept understanding achievement. Research formulas in this research are how are the assessment tool design to evaluate conceptual comprehension achievement and also science generic skills and chemistry literacy on ethno-science based chemistry learning? Is the developed assessment tool valid, reliable and practice in its usage ? The expected purpose of this research are: to get assessment instrument to evaluate conceptual comprehension achievement and also science generic skills and chemistry literacy on ethno-science based chemistry learning which is valid, reliable a and practice in its usage.

2. RESEARCH METHOD

This research is a developing research that based on the Mafumiko's model which studying on how to design, realize, revise and implement assessment instrument in ethno-science based chemistry learning. The implementation of the research was designed to follow developing research pattern like explained on Figure 1.

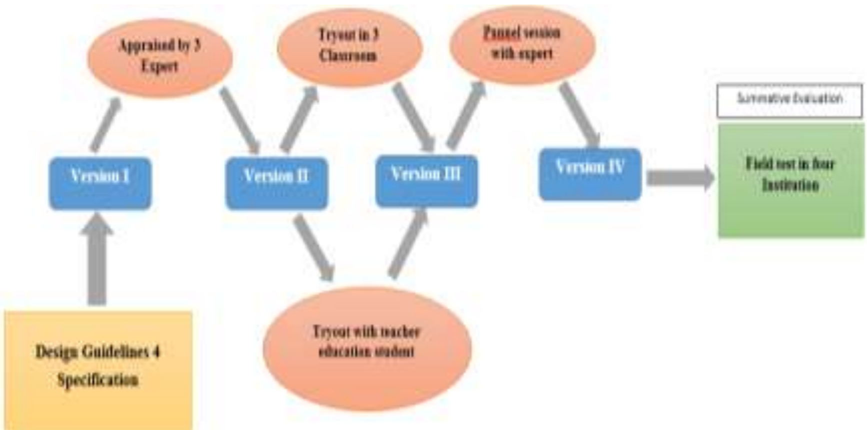

Figure 1. Assessment Instrument Development adapted from Mafumiko's model. [40]

2.1. Research Subject

The subject for practical test of assessment instrument in this research was chemistry college students of food and ingredients as well as assessment instrument users and their lecturers.

2.2. Research Instrument

The instrument of this research was paper sheet of experts' validation that was used to get information about content validity of arranged assessment instrument. On paper sheet of assessment instrument's validation, the validators write yes/no to every question. Other instrument was questionnaire contains of response of students and lecturers towards assessment instrument. This questionnaire was made to know the practical of existing assessment instrument. From this questionnaire lecturers and students are expected to give theirs suggestions for those assessment instruments.

2.3. Data Analysis

The gathered data obtained by using instruments above then being analyzed quantitatively and qualitatively to explain its validity, reliability, [41] and practical from assessment instrument that is developed.

2.3.1. Instrument's Validity Analysis

Validity analysis was based [42] on the giving method of overall content decision according to Judgment of expert. To know whether that test is valid or not, it was implemented by test items study to assure that those test items have represented the whole content or material that should be comprehended proportionally. If the measuring tool is valid, it can be used on the next step. But if it is not, there should be revision according to validators' suggestion or by looking back to low aspects then being revalidated and reanalyzed. It will be done until the data are categorized valid.

2.3.2. Reliability analysis of instrument

After assessment instruments are stated valid by experts, then limited try out test will be implemented on research subject. Instrument reliability was analyzed by Cronbach-alpha.

2.3.3. Practical Analysis of Instrument

The practical of assessment instrument is aimed to easiness using of those instrument [20]. The practical is assessed by response towards developed instrument. In this research, it were given questionnaires to two lecturers and 22 college students of instrument users. The obtained data then were analyzed by calculating how much responder that gave positive responses suitable to stated aspects then calculating the percentage. The decision of categorization for positive response is obtained by matching the result of percentage to the criteria that lectures and college students have positive responses towards instrument which is when they give positive response minimum 75% of all questioned aspects.

3. RESULTS AND ANALYSIS

The developing of this assessment instrument was implanted by systematic process though 4 phase of Plomp's model which are: (1) Early investigation phase, (2) design phase, (3) realization/construction phase, and (4) test, evaluation, revision phase.

3.1. Early Investigation Phase

This phase is aimed to gather and analyze information about evaluation problem in food ingredients chemistry learning, to identify and study theories that based on measuring instrument to evaluate learning result, theory about science generic skills, theory about chemistry literacy, theory about learning that based on ethno-science and its application. In this step, it is also implemented the information gathering through interview to lecturers of three LPTK in Central Java then continue by syllabus analysis, lesson plan, and also formative assessment paper, midterm test, and final test. The study result of curriculum in Chemistry Education of LPTK give information about range and material profundity on courses that can be designed to be lecturing that based on ethno-science. From some of the courses that are aimed to give provision to pre-chemistry teacher so that someday they will be able to teach chemistry in senior high school that integrated on ethno-science, thus it is chosen Food Ingredients Chemistry Courses as media to construct assessment instrument to evaluate chemistry literacy achievement and science generic skills. On the curriculum of chemistry learning in three LPTK, Food Ingredients Chemistry Courses is on the fourth or fifth semester. On the first table, it is showed that range material that is taught on Food Ingredients Chemistry Courses in those three LPTK Chemistry Learning. From Table 1, it can be concluded that the given material on Food Ingredients Chemistry Courses from three LPTK have similar topic. Thus, the constructed assessment instrument can be used in those three LPTK.

Table 1. The Range of Food Ingredients Chemistry Courses Material of Three LPTK Chemistry Education Program

No	Food Ingredient Chemistry Material		
	LPTK A	LPTK B	LPTK C
1	Food Ingredients Component (Water, Carbohydrate, Protein, Lipid, Vitamin, Mineral and its Analysis Procedure.	Chemistry concept of Food Ingredients.	Water in Food Ingredients a. Water relation in Food Ingredients b. Effect of water degree towards food ingredients quality. c. Water decreasing process in food ingredients.
2	Addict essense in food ingredients.	The characteristics of Biology, microbiology, physic and food ingredients chemistry (water, carbohydrate, lipid, protein, vitamin, mineral)	Carbohydrate in food ingredients a. Source and type of carbohydrate in food ingredients b. Relation of food ingredients texture toward food resource. c. Physic and Chemistry process in food ingredients.
3	Dangerous and poisonous compound on food ingredients and its solving.	The characteristics of biology, microbiology, physic and chemistry the effect of food production industry.	Protein in food ingredients a. Source and types of protein in food ingredients. b. Protein classification in food ingredients. c. Protein quality in food ingredients. d. Denaturation and decaying of protein.
4	Detriment of food ingredients (physic, chemistry, biology and micro biology).	The effect of storage, package, food additional ingredients, toward food industrial product related to the characteristic of biology, microbiology, physic and chemistry.	Lipid in food ingredients a. Source and types of lipid in food ingredients. b. Lipid classification in food ingredients. c. Physic and chemistry process of lipid in food ingredients.
5	Preserving technology	Analysis of Food Additional Ingredients (FAI) qualitatively and quantitatively.	Vitamin in food ingredients a. Source and types of vitamin in food ingredients. b. Treatment towards vitamin sources c. Physic and chemistry process of vitamin in food ingredients.
6	Manufacture technology	Poison in food ingredients, and the solving technology related to nutrient value.	Mineral in food ingredients a. Source and types of mineral in food ingredients. b. Mineral classification in food ingredients. c. Physic and chemistry process of Mineral in food ingredients.
7	Packaging technology	Waste of food ingredients	Addictive essence in food ingredients. a. Types of addictive essence in food ingredients b. Addictive food essence classification c. The effect of addictive essence usage toward food ingredients texture
8	Food safety	Food ingredients manufacture	Poisonous essence in food ingredients. a. Types and sources of poisonous essence b. Process of poisonous essence location in food ingredients.

3.2. Designing Phase

From the result of early investigation, planning step was implemented. The developing plots of this phase are (1) reconstruction of Food Ingredients Chemistry Courses syllabus, (2) deciding material that will be developed, (3) deciding SGS indicators and chemistry literacy, (4) deciding competence of every indicators, (5) deciding the amount of the questions that are suitable to SGS indicators and chemistry literacy, (6) deciding test clues, (7) constructing stimulus which are reading of chemistry science ethno-science integrated, main question and answer keys. In this research, assessment instrument was designed as essay with semi-opened answer contains of stimulus/reading related to chemistry material integrated of ethno-science, continued by main question to evaluate chemistry literacy and students' science generic skills. This essay decision is based on the opinion [43] that multiple choice items have low validity because high probability of right answer and for knowledge about reaction for example, hard to test using multiple choice items. Even though essay questions are wasting time and having potential of low objectivity of assessors, but it has high content validity[44].The low potential of objectivity can be increased by developing the guide of coding detail to open questions [45]-[47] can use empirical data[48]. The advantageous of using essay questions are 1) there will be students' answer that based on their understanding and experience, not by memorizing facts or theories [44],[45], 2) Essay questions, can measure every cognitive levels that might be a part of competence that can be assessed, like skills of expressing opinion, logical thinking, analytic and systematic [49], 3) can be used to analyze student's understanding development, spontaneous idea and skill of associating because essay questions relatively don't limit the responders' answer on many possible answers, 4) every main questions do not limit the responders' answer of various given possible answers. Those clue questions are showed on Table 2.

3.3. Construction/Realization Phase

This phase is the step of design result realization. As early constructing program of assessment instrument, carbohydrate material is decided. There are aspects that are assessed including 6 SGS indicators which are Observation, Symbolic Language, Modeling, Logic Inferential, Cause and Effect Relation, Principle Obedient of Logical Framework. While Chemistry Literacy assessment including content and science process with clues are stated on Table 1. Science generic skills that can be developed depending on the material characteristics and activities undertaken [10], as well as about the chemical literacy. On this phase it is produced prototype as the result of assessment instrument construction.

Table 2. Clues of science generic skill and chemistry literacy assessment for carbohydrate material

Question Number	Science Process					Science Concepts	Science Contexts	Science Generic Skills					
	1	2	3	4	5			Observation	Logical Frame	Cause and Effect Relation	Symbolic Language	Modeling	Logic Inferential
A						Carbohydrate	Local	√			√	√	
B.1					√	Photosyntesis	Local		√				
						Polymerization					√		
												√	
2	√					Amyl	Local					√	
			√			Cyanide Acid	Local						√
					√	Evaporation	Local						√
3	√				√	Osmosis Pressure	Local						√
4					√	Fermentation	Local			√			
5					√	Enzym	Local			√			
6						Micro Organism	Local					√	
7		√			√	Fiber/selulose	Local			√			
8				√			Local			√			
9					√	Carbohydrate Test			√				
					√								√

Note: Indicators aspects of science Process:
1. Recognizing scientifically investigable questions
2. Indentifying evidence needed in a scientific investigation
3. Drawing or evaluating conclutions
4. Communicating valid conclutions
5. Demonstrating and understanding of scientific concepts

The results of construction are re-researched whether or not the sufficient of supporting theories of assessment instrument is fulfilled and well-applied on every aspects that are assessed so it will be ready to be tested the validity by experts form theoretical rational angle and the consistency of the construction.

3.4. Evaluation and Revision Phase

On this stage, it were implemented 2 main activities, which are (1) validity activity and (2) try out field of prototype instrument which is stated as valid by experts to test reliability and practical test of the questions.This is consistent with the statement Weiner and Brown (in [50] that:a good assessment instruments should have validity and reliability. One of the methods to test item validity is by using experts' assessment [45]. In this research, instrument study descriptively was done by evaluation experts, material experts, and language experts. Instrument study descriptively was done by observing material aspect, construction and language. The result of validity for three experts is stated in Table 3.

On Table 3, it is showed that developed assessment instruments are stated very suitable by validators, thus after being revised suggested by validators, so the assessment instruments can be try out tested. Before try out test, chemistry learning that is integrated ethno-science is given on carbohydrate material as one of the components of food ingredients. In learning process, researchers give explanation about the process of question production that includes aspects that will be assessed and scored. Given questions need finishing steps, argumentations and analysis so it will be possible for researchers to see the process did by students in finding the answer. The information about test implementation is communicated to students so they can prepare themselves for the test. The Questions that are prepared categorized as moderate, because according to [51]. The questions that are too easy not stimulate students to enhance the ability to solve it, otherwise a question that is too hard will cause the student to be desperate and do not have the spirit to try again because out of reach ".Two kind of test are also being tested in the learning to simulate processing time. The score for each questions is different, but the amount of total items are 100. First try out test was implemented with the college students of food ingredients chemistry courses on one of the LPTK. Analyze questions reliability using α-Cronbach . Instrument is stated as reliable with r_{11}=0,72.

Table 3. The experts' assessment result of assessment instrument

Validator	Assessed Aspects			
	Material	Construction	Language	Average
Material Expert	100%	95%	95%	97.5%
Evaluation Expert	100%	100%	100%	100%
Language Expert	95%	95%	95%	95%
Average	98.3%	96.7%	96.7%	97.5%
Criteria	Very Suitable	Very Suitable	Very Suitable	Very Suitable

Assessment instrument then was being tested the practical by giving questionnaire to know the perception or response of lecturers and students towards instruments. The criteria to test instrument practical refers to the criteria stated by [52]. Statements given consist of 5 statements for students and 10 statements for lecturers. Used category are (4) very agree, (3) agree, (2) quite agree, (1) don't agree. The practical criteria are fulfilled if minimum 16 of 22 students give positive response (very agree and agree) on the given statements. Based on the try out test, more than 16 students for all of the statements give posistive response. So, the practical criteria of assessment instrument are fulfilled. The result assessment of practical value can be seen on Table 4. The practical value is also given for two lecturers of food ingredients courses. Assessment instruments are stated valid if all of lecturers give agree or very agree assessment. The result of practical value of assessment instruments are observed from the perception of lecturers that can be seen on Table 5. The perception of both lecturers towards instrument assessment was every lecturers give positive response for every questions given. It was showed that the assessment was categorized to be practical to be used, reviewed by lecturers' perception towards those assessments.

Table 4. The result of practicality of assessment instrument by students

Number	Statement	Total	
		Positive Response	Negative Response
1	Words/sentence in assessment instrument easily comprehended.	22	0
2	The provided time is enough to finish every question.	17	5
3	Assessment instruments are easy for usage.	22	0
4	Assessment is equipped with clear direction.	22	0
5	Assessments give freedom for students to do the easier part first.	22	0
	Average score of students's positive response	21	

Table 5. The result of practicality of assessment instrument by lectures

Number	Statement	Total	
		Positive Response	Negative Response
1	Words in assessment instruments are easily comprehended.	2	0
2	Questions are suitable with students' skill.	2	0
3	Assessment instruments make me easier in giving score for students.	2	0
4	The provided time is enough to finish every questions.	2	0
5	I become objective in assessing with scoring guidance,	2	0
6	Assessment gives various score for every scorer.	2	0
7	Easy to do interpretation towards test result.	2	0
8	Assessment is equipped with clear direction.	2	0
9	Assessment is equipped with key answers and scoring guidance.	2	0
10	Assessments give freedom for students to do the easier part first.	2	0
	Average score of students's positive response	2	

Based on content validity try out test and reliability of questions, it was obtained that developed indicators in form of test item have fulfilled the requirements as good test instruments although there were some of the questions that need to be fixed. Thus, test items of the test that generally used have fulfilled the requirements as good indicators to be developed more in form of test items to test SGS skills and chemistry literacy. Something in subjective test has been comprehended by students. Practitioners have been able to read and comprehend scoring rubric they made. The existence of local wisdom context in the passage, made students are possible to answer the questions divergently. The link between content, process and context of the relevant science will form a cognitive schema, so that learners acquire knowledge intact [53] in a meaningful context [54]. Likewise previous researchers [55],[56] showed that the question "why" is not just to remember something.

From the data description and analysis based on the questionnaire result, lecturers' interviews, student's comment, showed that assessment draft that are developed have fulfilled the criteria of assessment practicality which are easy to construct, easy to do because it does not need particular instrument and the students are free to do the questions from the easiest part first, easy to check because it has been equipped with answer keys and scoring guidance, and also have been equipped with clear direction.This is consistent with those expressed by [57] and[54], that the student evaluation that takes into account the context and the specific environment, may serve as a model that could easily be used in all disciplines of science, technology, engineering and mathematics. Even so, based on the analysis of students' answer, it was found that there were still questions that were hard to do. Students explained some reasons why they could not finish the questions well, which are: 1) Students have not been used to finish analytical questions that made them construct their own answer they need in the questions, 2) Students did not brave and confident enough in explaining idea/opinion by their own way, 3) Students have not been used to explain written reason in finishing problem also to write the process they did in solving questions. Some problems occur in data analysis, related to SGS indicators and chemistry literacy. When draft planning of early questions, some question items were considered to be able to assess SGS indicators and also chemistry literacy indicators, for example the questions on the attachment of science process aspect indicators that demonstrated science concepts comprehension with SGS indicators relation of cause and effect. But actually, when data analysis it occurred bias in deciding which indicators that could be assess from a student, whether the skill to demonstrate his science concepts comprehension, or the generic skills of his cause and effect relation.

Thus, in draft planning of try out test 2 will be completely separate between questions to reveal SGS indicators and questions to reveal chemistry literacy. The planned questions drafts for second tryout test were designed as the same as first tryout test which in written form that demanded students to memorize, comprehend, and organize their idea or something they learnt by showing or expressing those ideas in form of written essay by using their own words. If that so, on the developed drafts of second tryout test, there would be two question package, one for revealing SGS and the other one for revealing chemistry literacy that contains of stimulus/passages, main questions and answers. In this developing process to gain final prototype which is valid, practical, and effective assessment instrument, there might be cycle (repeated activity), which are: repeated revalidate and revision towards 1st prototype and the prototype that have fulfilled validity which have been tested for many times in the field until it fulfills the criteria of practical/implementation and effectiveness. Analysis conducted a combination of qualitative and quantitative [58][59], then assembles interpreted to conclusions.

4. CONCLUSION

Based on the research result and data analysis, it can be concluded that assessment instrument was produced related to local wisdom to measure skill level of chemistry and SGS students of teacher candidate.Assessment instrument that was designed to fulfill students' experience of local culture have been stated valid by expert from material, construction and language side. This result showed that the developed assessment instrument by researchers to measure skill of chemistry literacy and students' SGS have high internal reliability.Indicators of used SGS skill and chemistry literacy have fulfill the requirements as good indicators to be developed more in form of item tests to assess SGS skill and chemistry literacy of the students. It was needed a separation between questions to reveal SGS and chemistry literacy to make sure that it can reveal each indicators well (there will be no ambiguous in analysis result). Here by this construction of valid, reliable, and practical assessment instrument draft, something that need to be paid attention to in developing this assessment instrument are it was still needed discussion and socialization activity with expertise in learning evaluation and also the users to make a good quality of local cultural based assessment instrument and be able to assess SGS and chemistry literacy. Moreover, before applying this assessment instrument, it should be begun by ethno-science based learning and make students to have science generic skill and chemistry literacy.

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