

A Training Program based on Standards for teacher competence in the educational assessment to Improve Geography Pre-Service Teachers' Cognitive and Skills Competencies of Formative Assessment

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Abstract:

Formative assessment competencies are a vital part of geography pre-service teacher preparation because it allows them to acquire knowledge and skills that are essential in their professional working life as it helps them to assess their students' progress during the class time. This experimental study aims to improve Formative assessment competencies by using a training program based on Standards for Teacher Competence in Educational Assessment and active learning strategies. It also investigates geography pre-service teachers' competencies of formative assessment using two tests: test of cognitive competencies and test of skills competencies for formative assessment. Confirmatory Cronbach's Alpha and Pearson Correlation were used to measure reliability for each test; Intrinsic Validity, Face Validity and Content Validity were used to measure validity for each test also t test was used to measure the results of each test. The results revealed that there is great effect of the training program on improving cognitive and skills competencies of formative assessment for geography pre service teachers.

Key words: competencies of formative assessment- geography pre-service teacher trainees - Standards for teacher competence in the educational assessment - active learning strategies.

Introduction:

There has been substantial discussion in recent years about the importance of developing formative assessment skills for pre and in- service teachers (Barrett, A.et.al, 2014; National Council

of Teacher of English (NCTE) 2013; Ondigi, 2012; Zhang, 2003; Stiggins&Chappuis, 2006; Quellmalz&Kozma, 2003).

Formative assessment is a process designed to yield knowledge about student learning-information where educators are able to use teaching to meet students' needs. This purpose distinguishes Formative assessment from the other varieties of student assessment, such as diagnostic, which can be used to identify students who may have special learning needs, or summative, which is employed by teachers to form last judgments about what students have learned right at the end of a course, or can be used at the state level with regards to evaluating schools.(Trumbull,E&Lash ,E.,2013)

Formative assessment is obviously very demanding for both students and teachers. The accomplishment of formative assessment will lead to dramatic changes in pedagogy. it is an essential part of pre-service teachers' preparation because it allows them to acquire skills that are necessary for their professional working life; it has helped to boost levels of student achievement, better enabled teachers to meet the needs of increasingly diverse student populations, and helped to close gaps in equity of student outcomes. (National Council of Teacher of English (NCTE) 2013, p: 1). Also, using formative assessment approaches guide students in the direction of the development of their own "learning to learn" by Constructing students' skills for peer- and self-assessment, helping students understand their own learning, furthermore, building up appropriate strategies for "learning to learn". It has been an outstanding means of enhancing student's performance, and the overall levels of achievement, particularly, the accomplishment of lower performing students (Dunn& Mulvenon, 2009, p.9). As a consequence of becoming more aware of what and how they are learning, students turn to be more motivated.

Extensive researches proved the significance of developing formative assessment skills for pre and in-service teachers of various subjects. Therefore, it is crucial to develop formative assessment tools for geography pre as well as in-service teachers

because assessing students' progress in geography is one of the difficult issues teachers face. It requires time and hard work to build up the range of procedures and instruments necessary to adequately provide feedback to both teacher and students (Howes, N., and Hopkin, J. 2000 ;Leat, D. and McGrane, J. 2000 and Weeden, P. 2005).Geography requires more advanced approach to assessment and analysis because of its nature, as it offers opportunities for students to understand the relationships between people and places, the science of observation and location; it provides opportunities for individuals to gain a deeper knowledge of the transforming world, the changing surroundings and the changing economic, it helps students to face challenges posed by population explosion, pollution of the environment, regional, socio-economic inequality, resource depletion, etc., Moreover, the study of Geography provides opportunities for students to produce their general intellectual capacity for life-long learning, and for generic skills such as critical thinking, communication, information processing, problem solving, decision-making etc. furthermore it has shift accommodate the present and future of using modern techniques of geography (e. g. geographic information system, Remote sensing system and global positioning system).

This expanded view of the purposes of Geography education should be reflected in the curriculum and requires more sophisticated method of assessment and evaluation. Thus, a need to raise geography pre- service teacher awareness of formative assessment exists. They need to be aware of the role pupils can play, the importance of formative assessment, the characteristics of formative assessment, the marketing strategies and techniques of it and how it can be incorporated into teaching. Wylie, C. & Lyon, C. (2012) and Alkharusi, H., et.al. (2011).

Investigations of teachers' assessment practices revealed that teachers were not ready to meet the demand of classroom assessment because of inadequate training (Zhang& Burry-Stock, 2003). Also, earlier results reveal that pre-service teachers lack

assessment literacy, despite completing courses in classroom assessment. (Beziat, T. & Coleman, B. 2015).

Gebril& Brown proved that, in Egypt, formative assessment competencies received so little attention in the teacher preparation programs. Even after currently attempting to expose a greater formative use of assessment, major deficiencies were identified and could be summed up in the centralized system of education which uses exams as a way to control schools, students, and teachers, the emphasis on exams rather than skills development is another deficiency, and the use of examinations as the 'real' system of evaluating success is considered the fetal deficiency. (Gebril& Brown, 2013, p:16- 28)

Perhaps this overview on the philosophy of assessment and its purpose shows the reason behind the emphasis on summative assessment rather than formative assessment as an evaluative tool in teacher preparing programs.

In order to keep up with the international trends, geography pre-service teacher training needs to cope with this progression. Current studies have suggested that the need to implement training program is critical to increase the expertise of formative assessment. Therefore, the training program will be based on "Standards for Teacher Competence in Educational Assessment of Students "because These standards cover a variety of issues in assessment including, selecting and developing appropriate assessments that are valid and reliable; administering, rating and using the results of teacher made checks and standardized assessments; creating proper grading procedures; conversing assessment results and understanding the ethics of assessment.(Beziat, T. & Coleman, B.,2015, p:25) . Furthermore, Brook ,H.(2011) suggests the Requirements for Teacher Competence in Educational Assessment of Learners to be updated credited to formative assessment. These kinds of standards were developed with the purpose of leading teacher educators, developing teacher education program and workshop instructors as well as functioning as an inspiration for

educational measurement teachers to conceptualize student assessment more broadly. (Vingsle, C.2014, p: 19)

The problem:

- Researches state that Teachers graduate with an insufficient grasp of key assessment concepts (e. g., quality, bias and so forth) and low self-efficacy for using assessments (Volante & Fazio, 2007; Odo, 2015) these days, sufficient knowledge about how precisely to help in-service teachers and pre-service teachers develop their formative classroom practice is lacking. In the pursuit of gathering research evidence about the specific content, design of professional development programs and teacher education and learning courses in formative assessment, it is vital that there is a need to know what sort of skills and knowledge teachers need to efficiently practice formative classroom assessment. (Vingsle,C. 2014, p: 1)
- Recommendations indicated the fundamental importance of preparing pre and in service teachers to utilize formative assessment skills (OECD/CERI International Conference, 2008) as it is proved that there are deficiencies in the assessment processes at every level of education and inadequacies in the assessment forms at each level of instruction. Therefore, teacher education programs should give much more noteworthy accentuation to preparing teachers in modern assessment practices including those intended for diagnostic purposes in identifying students' learning needs and aptitudes, checking understudy advance, and interpreting results from large-scale national and international assessment exercises. (Dewidar, 2012); (OECD, 2015)
- Hargreaves, E. 1997; Hargreaves, E., 2001; Gebril& Brown, 2013, concluded that in Egypt, education is centered outclassed by the use of examinations to select students for access to further educational opportunities rather than the use of formative assessment.

- The Ministry of Education introduced the Comprehensive Assessment (CA) motivation. CA attempts to embed assessment activities within coaching and make it an ongoing process. The subsequent quotation from the 2000-2015 strategic plans describes this process: Recently, attempts have been made to expose change at the early primary level in the form of a combined assessment approach depending on National Standards, namely Comprehensive Assessment. Typically, the final grade in primary grades from year one to three is based on an exam score combined with performance on activities and an on-going student portfolio. It is hoped that this model will act as a prototype for reform of assessment method at higher levels (NCERD, Educational for all in Egypt 2000 – 2015 a national assessment, 2014, p: 8). So, on the academic side; pre service and in service teachers need to be prepared with the knowledge and skills pertaining for how and why they ought to use formative and summative assessment.

A pilot study:

A questionnaire was used in pilot study to better understand the role of methodology courses in increasing the Geography pre-service teachers 'awareness of formative assessment knowledge, techniques, strategies and skills , the sample was taken from third stage Geography pre-service teachers ; random sampling techniques was used to collect the sample of this study. The form of questionnaire was contained of (6) open ended questions. Participants were asked to compare between summative and formative assessment definitions; identify the characteristics of formative assessment; identify the levels of feedback; give examples of some strategies of formative assessment; compare between self-assessment and peer assessment (PASA); determine how to analyze strengths and weakness in students' answers during teaching practice at schools? The results revealed that more than 60% of students were not aware of the difference between summative and

formative assessment definitions ; also The results revealed that more than 95% of students were not aware of the characteristics of formative assessment; the levels of feedback; examples of some strategies of formative assessment; the difference between self-assessment and peer assessment (PASA) and how to analyze strengths and weakness in students' answers during teaching practice at schools. The study revealed a need of Geography pre-service teachers to improve their awareness of formative assessment. it also revealed the shortage in methodology courses that do not expose pre-service teachers to a variety of effective formative assessment knowledge, techniques, strategies and skills . So the study asserted the importance of preparing training program to improve Geography pre-service teachers' formative assessment competencies.

Statement of the problem:

The problem of the present study can be identified in Geography pre-service teachers'- at Faculty of Girls, Ain Shams University- need to improve their formative assessment competencies based on the standards for teacher competence in educational assessment. This need might be attributed to the shortage in methodology courses that do not expose pre-service teachers to a variety of effective formative assessment knowledge, techniques, strategies and skills.

Hence, the current study seeks to answer the following main question:

What is the effectiveness of a training program based on Standards of Teacher Competence in Educational Assessment to improve formative assessment competencies for geography pre-service teachers?

From this main question, the following questions emerge:

1. What are the cognitive competencies of formative assessment?
2. What are the skills competencies of formative assessment?

3. What is the effectiveness of a training program on improving cognitive competencies of formative assessment for geography pre-service teachers?
4. What is the effectiveness of training program on improving skills competencies of formative assessment for geography pre-service teachers?
5. How far would a program based on the standards of Teacher Competence in Educational Assessment be effective in improving Geography pre-service teachers' cognitive and skills competencies formative assessment?

The aims of the study:

This study aimed at:

- Preparing cognitive and skills competencies of formative assessment for geography pre-service teachers.
- Plan a training program based on Standards for Teacher Competence in Educational Assessment to improve geography pre-service teachers' competencies of formative assessment.
- Training geography pre-service teacher on activities and characterize the knowledge and skills of formative assessment by using active learning strategies.
- Identifying the effect of teaching suggested program in developing competencies of formative assessment for geography pre-service teachers.
- Investigating the development of geography pre-service teachers with respect to classroom-based formative assessment.

Importance of the study:

The importance of this study lies in the following:

- It is a response to the results and recommendations of many studies and literature in the field which recommended the necessity of improving the use of

formative assessment skills into practice and developing understanding of formative assessment.

- Keeping pace with the contemporary international changes in developing formative assessment skills and knowledge for pre-service teachers.
- Introducing a suggested training program for pre-service teachers to use formative assessment into practice.

Tools of the study:

- Cognitive competencies test of formative assessment.
- Skills competencies test of formative assessment.

Delimitations of the study:

- Third year Geography Pre-service teachers, Faculty of Women for Arts, Science & Education, Ain shams university.
- Some of cognitive competencies of formative assessment.
- Some of formative assessment skills competencies.

Hypotheses of the study:

1. There is a statistical significant difference at $p < 0.05$ between the mean scores of the Pre-service teachers in formative assessment cognitive competencies pre-posttest before and after the treatment in favor of the post administration.
2. There is a statistical significant difference at $p < 0.05$ between the mean scores of the Pre-service teachers informative assessment skills competencies pre-posttest before and after the treatment in favor of the post administration.

Design of the study:

This study depended on the descriptive analytic method to prepare competencies of formative assessment and to build framework of the suggested training program and tools of the study. It also used the quasi- experimental design (pre-post one group) for identifying the effect of the training program in

developing competencies of formative assessment for geography Pre-service teachers.

Terms of the study:

Geography Pre- service teachers:

Geography Pre-service teachers in Egypt are trained in faculties of education (FOEs) which provide A Bachelor of Education programs, in which student teachers pursue their professional studies while also studying academic subjects in their areas of specialization (geography). These 4-year programs compare favorably in length with international good practice; all program requirements that will permit them earn teacher documentation after passing the required examinations. (OECD, 2015, p: 115)

Formative assessment:

Formative assessment, in this research, is defined as the process of appraising, judging or evaluating students' work or performance during classroom practice and using this to shape and improve teacher strategies and activities to modify their work in order to make it more effective.

Cognitive competencies of formative assessment:

Cognitive competencies of formative assessment are the capability to use and understand the knowledge required to successfully perform complex tasks in formative assessment such as compare between concepts of assessment; recognize formative assessment strategies according to Sadler's three conditions and identify the levels of feedback.

Formative assessment skills competencies:

Skills competencies of formative assessment are the ability of pre-service teachers to use formative assessment skills such as Analyze strengths and weakness in students' answers; apply some of formative assessment strategies during the planning geography lesson and determine how to apply self and peer assessment into practice.

Review of literature:

1. Standards for Teacher Competence in Educational Assessment of Students:

The professional education associations started outworking in 1987 to develop standards for teacher competence in student assessment out of interest that the potential educational benefits associated with student assessments be fully recognized. The Committee appointed to this project completed their work in (American Federation of Teachers, National Council on Measurement In Education, & National Education Association, 1990).

These standards cover a variety of issues in assessment including, selecting and developing appropriate assessments that are legitimate and reliable; administering, rating scoring and using the results of teacher made assessments and standardized assessments; creating proper grading procedures; interacting assessment results and understanding the ethics of assessment. (Beziat, T. & Coleman, B., 2015)

The particular standards are intended for use as:

- A new guide for teachers as they design and approve programs for teacher preparation.
- A self-assessment guide for teachers in identifying the requirements for professional development in student assessment.
- Helpful information course as they design professional development activities for in-service teachers.
- The Standards for Teacher Competence in Educational Assessment of Students are the following: Teachers should be skilled in choosing assessment methods appropriate for instructional decisions; Teachers should be skilled in developing assessment methods suitable for instructional decisions; The teacher should be skilled in administering, scoring and interpretation the results of bothexternally-producedandteacher-producedassessment

methods; Teachers should be skilled in using assessment when coming up with decisions about individual students, planning teaching, developing curriculum, and school improvement; Teachers should be skilled in developing appropriate pupil grading procedures which use pupil assessments; Teachers should be skilled in communicating assessment leads to students, parents, other lay followers, and other educators and Teachers should be skilled in recognizing unethical, illegitimate, and otherwise inappropriate assessment methods and uses of assessment information.

According to many of these and **the researcher** identify cognitive and skills competencies of formative assessment.

2. Formative assessment:

2.1. What is Formative Assessment?

Formative assessment, is defined as "the process employed by teachers and students to recognize and react to student learning in order to boost that learning, during the learning."(Bell, B. & Cowie, B.2000); Assessment can be viewed as formative only if it brings about action by the teacher and students to improve student performance (Black, 1993); Formative assessment has recently been understood to be the process of appraising, judging or analyzing students' work or performance and using this to form and improve students' competence. (Gipps, 1994); Formative assessment is an organized process that uses assessments to inform changes in instruction or learning (Popham, 2008). Formative assessment is defined by its goal which is to help form, or shape, a student's learning during the learning process (Trumbull,E&Lash ,E.,201), (Bell& Cowie, 2000) , Black and Wiliam (1998)

As formative assessment is viewed as the connection between teacher and student(s), it is at the intersection of teaching and learning (Gipps, 1994). In this way, teaching, learning, and assessment are integrated in the curriculum.

A single widely accepted definition of formative assessment describes it as a classroom-based process in which students and teachers accumulate proof of learning in order to understand current learning progress and make adjustments to learning and teaching as necessary (NICOL, D.J. ,(2005);Herman, J., L.et. al. (2010);Wylie, C. & Lyon, C. (2012) and McCallum,B.(2013).

2.2. The purposes of formative assessment:

There are two main purposes of formative assessment the first is to support students' learning while the other is to improve teachers' teaching.

First, to support the students' learning included monitoring the improvement, learning, or understandings of the students during the teaching and learning. While improving teachers' teaching included giving feedback to students as to what learning was valued in their classroom, offering legitimacy to the students' scientifically acceptable ideas, assisting long- or short-term goals, and finding out whether an activity or task was "working. (Bell& Cowie, 2000, p: 550)

2. 3. Key characteristic of formative assessment:

The distinguishing attribute of formative assessment is that the assessment information is used, by the teacher and pupils, to change their work in order to enhance it and be more effective. (Black, 1995)

Bell & Cowie's study (2000, p: 544 -249) explained some characteristics of formative assessment, the following are those which serve the present study:

1. Formative Assessment is Reactive in many ways: That it was recognized by its ongoing, active, and progressive nature and it tended to be informal, with no written record of the information gathered. Formative Assessment is interactive as it involves interactions between teacher and student during the teaching and learning process. It could be Proactive or reactive as it involves responding to Individuals as well as the Whole Class.

2. Formative assessment provides information and evidence. Like summative assessment, it may use students' written or oral work.
3. It is often a tacit process. A new frequent comment from the teachers is that they were not always consciously aware about doing formative assessment, specifically unplanned or interactive formative assessment.
4. It was seen to rely on a teacher's professional knowledge and experiences. This professional knowledge and experience included the teachers' knowledge and activities of the topic, and teacher's prior knowledge of the students themselves.
5. Formative assessment is an action taken by both teachers and students. This action leads to gaining or obtaining information about the learning/teaching process.
6. Another characteristic of formative assessment is that both the teacher and the student are doing the assessment.

2. 4. Strategies and techniques of formative assessment:

Formative assessment strategies are being used throughout a unit of study. Teachers are linked to the instruction and give attention to obtaining what students know and need to find out about the conclusion goal or outcome. Teachers use formative assessment during the learning process and use the information to make adjustments to their instruction to better gratify learner needs. Students also play an important role in class based formative assessment (Regier, N. 2013, and p: 5).

Formative assessment strategies come in a variety of formats such as: homework, quizzes, tests, get out of tickets, concept mapping, solving problems, observation, Surveying student, Student feedback, and self and peer assessment, etc. (Garrison, C. &Ehringhaus, M., 2014, p: 2)

(Regier, N. 2013) classified Formative assessment strategies into: formative assessment strategies for teachers such as ABC Brainstorming ; Analogies, Checklists, Choral Response,

Cloze Procedure, Concept Maps, Discussions; Double Entry Journals, Examples/Non-Examples, Three Facts and a Fib and Fist of Five etc; And formative assessment strategies for students such as Ask, Process Exemplars, Self-Marking Quizzes and Writing Continuums.

To summarize:

Formative assessment is an essential part of pre-service teachers' preparation because it allows them to acquire skills that are necessary for their professional working life, it has many characteristics and purposes to use into classroom, and it has a variety of strategies teachers used to raising overall levels of student accomplishment.

Procedures of the study:

First: preparing list of formative assessment competencies according to the Standards for Teacher Competence in Educational Assessment of students.

The list aimed to determine the most important cognitive and skills competencies of formative assessment for geography pre-service teachers. In their initial form were submitted to a panel of (9) jury members specialized in geography Education to give their opinion, Phrasings of some competencies items were modified and some items were omitted in the light of the opinion of the panel of jury members. After making the modifications and omitting some items in the light of the panel of jurors' opinions the final version of the competencies consists of (7) cognitive and (3) skills competencies as the following:

Cognitive competencies:

- Competence 1: pre-service teaches will be able to compare between concepts of assessment (e.g. formative assessment – summative assessment – diagnostic assessment).
- Competence 2: pre-service teachers will be able to identify the characteristics of formative assessment in

geography education and explain the reasons of using it into classroom.

- Competence 3: pre-service teachers will be able to identify the roles of teachers and students in the classroom based on formative assessment.
- Competence 4: pre-service teachers will be able to recognize formative assessment strategies according to Sadler's three conditions.
- Competence 5 :pre-service teachers will be able to give examples of some strategies of formative assessment suitable for geography education,
- Competence 6: pre-service teachers will be able to identify the levels of feedback.
- Competence 7: pre-service teachers will be able to compare between self-assessment and peer assessment (PASA).

Skills competencies:

- Competence 1: Analyze strengths and weakness in students' answers.
- Competence 2: apply some of formative assessment strategies during the planning geography lesson.
- Competence 3: determine how to apply self and peer assessment into classroom.

Second: Preparing the training program:

The training program followed several procedures which are:

1. Identifying the aims of the program:

This training program aims to improve formative assessment cognitive and skills competencies of geography pre-service teachers.

2. Preparing the content of the program based on:

- a. Standards for Teacher Competence in Educational Assessment of Students (1990).

- b. The previous studies and researches related to the current study.
 - c. Characteristics and needs of geography pre service teacher students.
 - d. The nature of geography education.
 - e. The content of teaching methods of geography and its objectives in education colleges.
 - f. Characteristics, strategies and techniques of formative assessment.
3. The content of the program:

The program consists of three sections as follows:

First section: fundamental information and skills about formative assessment.

It provides introduction about the importance of formative assessment; its characteristics; the reasons of using formative assessment techniques (FACTs) into classroom; the levels of feedback and examples of peer and self-assessment techniques.

The second section emphasizes the practical application on what they have learned through planning geography lessons based on formative assessment strategies and techniques.

The third section emphasizes answering reflective activities at the end of each subject.

Third: preparing the lecturer's guide

A lecturer's guide has been prepared in the light of subjects of the program, a group of strategies and instructional activities that suit the cooperative learning, brainstorming and discussion topics were selected in the program.

Fourth: preparing students' worksheets:

Some of the aids and instructional activities and assignment were used in teaching through students' worksheets such as:

Table (1) Training program planning chart

Authentic Context	
First section of training program	
<p>This section introduces students with fundamental cognitive information about formative assessment. And provides introduction about the importance of feedback</p>	<p>Details: by using discussion strategy students Compare between diagnostic, formative, and summative assessment and Identify the relationship between assessment, curriculum and teaching.</p> <p>By using cooperation strategy students answer the question what is the relationship between assessment, curriculum and teaching.</p> <p>By using cooperation strategy students Determine the Characteristics of Formative Assessment and Compare between the role of teachers in regular classroom and in classroom based formative assessment.</p> <p>By using completed worksheet students Compare between the role of students in regular classroom and in classroom based formative assessment and explicit the main elements of formative assessment.</p> <p>By using think -pair - share students answer the question When and how is formative assessment strategies used? And discuss The seven strategies fulfill Sadler's three conditions and discuss variety of formative strategies such as Analogies strategy, Checklists, Choral Response, Concept Maps,; Map Classification, Double Entry Journals, Examples/Non-Examples, Exit Cards, Four Corners, Learning Logs, One Minute Essays, One Sentence Summaries, Open-Ended Questions, Repeat Pre-assessments, Reflection activities.</p> <p>By using summary strategy students summarize the main points about formative assessment strategies and techniques and the importance of using them into classroom.</p> <p>By using discussion students discuss The definition of feedback; Three levels of feedback: Task Level, Process level and Self-regulation and Sources of feedback.</p> <p>By using worksheet students discuss the main points about feedback and how to use into classroom.</p> <p>By using talk - aloud? Strategy students explain The definitions of Peer assessment and self-assessment and give Examples of good practice of peer and self-assessment.</p>
Section two planning and designing lessons based on formative assessment strategies	
<p>In this section students are trained on how to analyze</p>	<p>By using samples of students' answers of some geography exams and quizzes for secondary grade</p>

<p>strengths and weakness in students' answers. How to apply some of formative assessment strategies during the planning geography lesson, how to apply self and peer assessment into classroom and how formative assessment is linked to curriculum.</p>	<p>(2016) pre service teachers analyze weakness and strengths in the students' answers and discuss how this step affects their choice of teaching formative assessment strategies. By using discussion and practice students design mini lesson plan based on strategies of formative assessment; design peer and self-assessment checklists; design rubric for projects or open-ended questions. (students use geography textbook for first grade secondary)</p>
<p>Section three reflective activities</p>	
<p>These section students reflect their understanding of subject's program through answering reflective activities which are included at the end of each subject.</p>	<p>By using truth statements; organizing information and summary strategies students answer reflective activities.</p>

Assigning students to collect some articles that dealt with the topics of the unit from magazines and newspapers; compare between summative –formative and diagnostic formative; design mini lesson plan based on strategies of formative assessment; design peer and self-assessment checklists; design rubric for projects or open-ended questions.

Students have been trained on all the activities by using geography text book for secondary grade. (2016)

4. Validating the program to make sure of its suitability

The program was submitted in its initial form to a panel of jury members interested in geography Education to get their opinion concerning:

- The general form of the program.
- The extent to which the program is suitable to the geography pre-service teachers.
- The extent to which the content of the program relates to its aims.
- The extent to which the topics of the program are sequenced and related to each other.

Fifth: Preparing the instruments of the study

Test of cognitive competencies of formative assessment

- **Aim of the Test:** to measure cognitive competencies of formative assessment for geography pre-service teachers
- **Formulating Test items:**
Test items were formulated as multiple choices with four responses paying attention that the items be distributed to the topics of the unit. The test in its initial form consisted of 42 items.

Test validity:

To measure validity of cognitive test the researcher used three kinds of validity as follows:

Face Validity: The test in its initial form was submitted to a panel of (9) jury members specialized in geography Education to give their opinion, Phrasings of some test items were modified and some items were omitted in the light of the opinion of the panel of jury members.

Content Validity: the items were partly adapted from Classroom Assessment Literacy Inventory (CALI) by (Mertler 2003); Standards for Teacher Competence in Educational Assessment of Students and Teacher Competency Assessment (TCA).

Intrinsic Validity: 0.85 which indicates that the test has high validity.

Piloting the Test:

The Test was piloted on a sample of geography pre-service teacher in third graders (n=60) other than the sample of the study in order to:

Estimate Test reliability:

Test reliability was estimated using:

1. Cronbach's Alpha. The reliability coefficient was (.722) which indicates that the test has high reliability.

2. Internal consistency: it describes Correlation coefficients between the score of each dimension and the score of other dimensions. In addition, the correlation between the score of each dimension and the total score of the test were calculated.

The researcher concluded that each dimension in the test has statistically significant correlations to the other dimensions and to the total score of the test indicating that the test has a high degree of internal consistency. The results of the internal consistency are shown Table (2)

Table (2): Internal consistency for cognitive competencies test

cognitive competencies	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5	Comp. 6	Comp. 7	Total Comp
Comp. 1		.952**	.906**	.772**	.770**	.758**	.703**	.702**
Comp.2	.952**		.877**	.755**	.737**	.727**	.698**	.647**
Comp.3	.906**	.877**		.660**	.693**	.645**	.679**	.638**
Comp.4	.772**	.755**	.660**		.660**	.693**	.645**	.888**
Comp.5	.770**	.737**	.693**	.969**		.931**	.933**	.830**
Comp. 6	.758**	.727**	.645**	.947**	.931**		.825**	.846**
Comp. 7	.703**	.698**	.679**	.900**	.933**	.825**		.722**
Total Comp.	.702**	.647**	.638**	.888**	.830**	.846**	.722**	

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Estimate Test duration :

The suitable time for all students to finish answering all Testitems was (50) minutes.

The final form of the Test

After making the modifications and omitting some items in the light of the panel of jurors' opinions, the Test included (42) items. One score was given to each correct answer and a zero to each wrong answer. Thus, the total scores of the Testis (42).

Test of skills competencies of formative assessment

Aim of the Test:

To measure skills competencies of formative assessment for geography pre-service teachers.

Formulating Test items

Test items were formulated as open ended questions that the items were distributed to the skills of formative assessment. The test in its initial form consisted of 18 questions.

Test validity:

To measure validity of cognitive test the researcher used three kinds of validity as follows:

Face Validity: The Test in its initial form was submitted to a panel of jury members specialized in geography Education to give their opinion, Phrasings of some Test items were modified and some items were omitted in the light of the opinion of the panel of jury members.

Content Validity: the items were partly adapted from Classroom Assessment Literacy Inventory (CALI) by (Mertler 2003); Standards for Teacher Competence in Educational Assessment of Students and Teacher Competency Assessment (TCA).

Intrinsic Validity: 0.86 which indicates that the test has high validity.

Piloting the Test

The Test was piloted on a sample of geography pre-service teachers in third graders (n=60) other than the sample of the study in order to:

Estimate Test reliability:

Test reliability was estimated using:

1. Cronbach's Alpha. The reliability coefficient was (.731) which indicates that the test has high reliability.
2. Internal consistency: it describes Correlation coefficients between the score of each dimension and the score of other dimensions In addition, the correlation between the score of each dimension and the total score of the test were calculated.

The researcher concluded that each dimension in the test has statistically significant correlations to the other dimensions and to the total score of the test indicating that the test has a high degree of internal consistency. The results of the internal consistency are shown Table (3)

Table (3): Internal consistency for skills competencies test

skills competencies	Comp. 1	Comp.2	Comp.3	Total competencies
Comp. 1		.590	.679	.701
Comp.2	.590		.633	.776
Comp.3	.679	.633		.667
Totalcompetencies	.701	.776	.667	

***. Correlation is significant at the 0.01 level (2-tailed).*

* *Correlation is significant at the 0.05 level (2-tailed).*

Estimate Test duration:

The suitable time for all students to finish answering all Test items was (60) minutes.

The final form of the Test:

After making the modifications and omitting some items in the light of the panel of jurors' opinions, the Test included (18) items.

Score of the test distributed by using analytical rubrics criteria to help the researcher grade more objectively, a grading rubric includes criteria, levels of performance, scores, and descriptors of each question. Thus, the total scores of the Testis (54).

Sixth: selecting the sample

Sample of the study consisted of Geography Pre service teachers enrolled in third year in Faculty of Girls, Ain shams university.

Seventh: Administering instruments of the study:

Administering the instruments before the experimentation:

Test of cognitive competencies of formative assessment and Test of skills competencies of formative assessment were

administered to the sample before teaching the training program.

Teaching the training program:

The training program was taught to the sample by using active learning strategies. Administering the instruments and teaching the training program lasted for 15 lectures during the first term of the academic year 2016/ 2017

The program takes approximately 30 hours to complete.

Administering the instruments of the study after the experimentation:

The formative assessment cognitive competencies test and the formative assessment skills competencies test were administered to the sample after finishing teaching the training program.

Results of the study:

Forty-two pre-service teachers completed formative assessment cognitive and skills competencies pre-posttests. T – Tests were used to determine if there were overall differences found and if students' score differ from the pre-tests to the post test per competence.

First: Results of administering the formative assessment cognitive competencies test

The samples mean scores in the pre-posttest as a whole and for each level were calculated (table 4)

Table 4: of formative assessment cognitive competencies Pre-posttest of Means and standard deviation

cognitive competencies	Pre test		Post test		t- test	Level of significant
	Mean	standard deviation	Mean	standard deviation		
Competence 1	.83	.881	4.29	.835	-21.031-	.000
Competence 2	1.81	1.042	4.71	.554	-14.880-	.000
Competence 3	1.29	.918	5.67	1.572	-14.287-	.000
Competence 4	1.14	.608	4.62	.697	-23.255-	.000
Competence 5	2.33	1.603	5.14	.926	-11.092-	.000
Competence 6	1.43	.831	4.33	.874	-15.880-	.000
Competence 7	2.31	1.278	7.57	1.451	-18.316-	.000
TotalCompetencies	7.57	1.451	11.14	2.710	7.079	.000

The results show that there is a statistical significant difference at $p < 0.05$ between the mean scores of the Pre service teachers in test of cognitive competencies of formative assessment before and after studying the suggested program in favor of the post administration This indicates that teaching the suggested program has positive effects in developing cognitive competencies of formative assessment for geography pre service teachers. Thus, the first hypothesis of the study proved to be valid.

Concerning the effect size of the program on developing cognitive competencies of formative assessment Cohen's d Calculator for T Test was calculated. It reached Cohen's $d = (8.6)$, effect size = (0.97) which means that program has a high effectiveness on cognitive competencies.

Second: Results of administering the test of skills competencies of formative assessment

There is a statistical significant difference at $p < 0.05$ between the mean scores of the Pre-service teachers' formative assessment skills competencies test before and after studying the suggested program in favor of the post administration. The sample's mean scores in the pre-posttest as a whole and for each level were calculated (Table 5)

Table 5: Mean, standard deviation, t-values, for the formative assessment skills competencies test.

skills competencies	Pre test		Post test		t- test	Level of significant
	Mean	standard deviation	Mean	standard deviation		
Competence 1	3.63	2.009	10.49	2.087	17.874-	.000
Competence 2	3.34	2.394	13.63	2.165	-19.815	.000
Competence 3	2.24	2.267	21.02	3.236	29.317-	.000
Total competencies	9.22	4.778	45.15	4.569	36.117	.000

The results show that there is a statistical significant difference at $p < 0.05$ between the mean scores of the Pre-service teachers' performance on the formative assessment skills competencies test before and after studying the suggested program in favor of the post administration This indicates that

teaching the suggested program has positive effects in developing skills competencies of formative assessment for geography pre-service teachers.

Thus, the second hypothesis of the study proved to be valid.

Concerning the effect size of the program on developing formative assessment skills competencies of Cohen's d Calculator for T Test was calculated. It reached Cohen's $d = (33.79)$, effect size = (0.99) which means that program has a high effectiveness on skills competencies.

Discussion of the results:

As noted previously, the goal of this research is to monitor and improve geography pre-service teachers' knowledge and skills of formative assessment. This study helped to identify areas of weakness of using formative assessment into classroom practices including knowing fundamental knowledge and skills of formative assessment and training them on how to plan lessons in geography by using formative assessment strategies and technique; The basics how to choose strategies and how formative assessment is linked to curriculum information and skills.

Pre-test results indicate that geography pre-service teacher program of methodology may need a greater focus on formative assessment knowledge this result agrees with the results of some studies proved that pre-service teachers were lacking knowledge and skills in assessment such as Alkharusi, H ,et.al.(2011) ; Dunn,K. &Mulvenon,S.(2009) and Beziat, T. & Coleman, B. (2015) and agrees with the studies that were recently conducted in Egypt that-highlight some of the issues and discrepancies in teacher assessment knowledge and skills such as Hargreaves, E. (1997) ;Hargreaves, E. (2001) ;Gebril, A., & Brown, G. T. (2013); Gebril, A. &Hozayin, R. (in press) and Gebril, A. &Taha-Tamure, H. (in press).

Also, results prove those better preparing pre-service teachers' knowledge and skills of formative assessment help them to build skills for peer- and self-assessment; learning to

learn; know the importance and characteristics of formative assessment and learn how to use strategies and techniques based on formative assessment in right way.

On the other hand, During the practical part the researcher notice that some competencies were difficult to students such as skill competence one which required pre service teachers analyze weakness and strengths in the students' answers By using samples of students' answers of some geography exams and quizzes for secondary grade (2016) also ; skill competence three which required pre service teachers design peer and self-assessment checklists; design rubric for projects or open-ended questions perhaps this is because of leakage in applying skills. During learning some competencies such as cognitive competencies and use strategies into lesson plans, they had enthusiasm. This enthusiasm may be because of fully- informed holistic view of formative assessment subject.

Recommendations of the study:

- Prepare programs for in-service teachers to promote the development of cognition and skills of formative assessment.
- There is a need to connect course content with field-based experience to maximize pre-service teachers' understanding of formative knowledge and how to use it in practice.
- Develop programs based on active learning strategies to improve primary and high school students' self and peer assessment.

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