

## **Identification of Constructs and Subconstructs of Teacher Classroom Assessment Literacy Instrument**

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### **ABSTRACT**

This study was conducted to identify constructs and subconstructs of teacher classroom assessment literacy instrument. Qualitative document analysis was conducted to identify the constructs and subconstructs used. This document covers previous research articles, modules, and standard documents used in conducting classroom assessments. The qualitative data are analyzed using the literature review system model with four thematic analysis phases. Four main themes or constructs of classroom assessment literacy are derived from the document analysis: Purpose, Measurement, Evaluation, and Use. These four themes are used as the basis for analyzing the Classroom Assessment Standard and Classroom Assessment Implementation Guide from the Ministry of Education Malaysia as the main reference of the study. Besides, four 21st-century assessment features, nine classroom assessment features, and five features of high-order thinking skills items are also included in the analysis as an added value in the constructs and subconstructs. Based

on the analysis, three subconstructs for the purpose component, seven for the measurement component, four for the assessment component, and five for the usage component are identified. All these findings are incorporated into the teacher's assessment literacy instrument.

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## INTRODUCTION

Assessment is any process of information observation to interpret students' performance through various ways or practices (Messick, 1989) and is considered a curriculum liaison that drives the learning process (Jing & Zonghui, 2016). Therefore, it needs to be planned and implemented well to benefit teachers and students, particularly in improving student achievement (Thomas et al., 2004). Thus, the Ministry of Education Malaysia (MoE) has outlined the guidelines for the implementation of effective assessment in the classroom, starting with the planning for teaching, learning, and assessment methods; implementing teaching, learning, and assessment; recording and analyzing student mastery; and reporting on students' level of mastery (Curriculum Development Division [CDD], 2019).

Teachers' ability, knowledge, and understanding of the concept and implementation of the basic procedures set out in this classroom assessment are defined as assessment literacy by H. Xu (2017) and Gotch and French (2014). It is also considered important because its effectiveness can influence an educational decision (Gotch & French, 2014), such as improving the quality of teaching and learning that drives expected achievement by measuring, analyzing, interpreting, and using student performance data to identify learning needs. Thus, conclusions can be made by stating that assessment literacy is an important relationship between assessment quality, teaching, and student

accomplishment, as emphasized by previous researchers (Ashraf & Zolfaghari, 2018; Mellati & Khademi, 2018; N. Muhammad et al., 2020; Zolfaghari & Ahmadi, 2016).

The importance of teacher assessment literacy has long been acknowledged and regarded as a requirement at all levels of education (Jawhar & Subahi, 2020). It is evident in related research that is ongoing until today (Edwards, 2020; Janesar et al., 2020) covering various fields (Tajeddin et al., 2018): language (Coombe et al., 2020), mathematics (Thronsen et al., 2020), health (Hawkins et al., 2020) and chemistry (Mughtar et al., 2020), and providing a focus on assessing and understanding teacher assessment literacy (Jawhar & Subahi, 2020): teacher training and preparation levels (DeLuca et al., 2016; Mertler, 2003; Pastore & Andrade, 2019; Plake et al., 1993), classroom assessment (Chappius et al., 2012; DeLuca et al., 2015; Jawhar & Subahi, 2020; Y. Xu & Brown, 2016; Yamtim & Wongwanich, 2014), and the context of the latest assessment policy (Gotch & French, 2014). However, this study only seeks insight into teacher classroom assessment literacy (TeCAL).

Lack of assessment literacy affects not only the quality of assessment but also the quality of teaching and learning due to misinterpretations made by teachers (Pastore & Andrade, 2019). This misinterpretation drives the motive of this study, which acknowledges that TeCAL needs to be measured to determine the effect levels on the assessment approaches in education. Document analysis from the literature

review needs to be done to obtain the latest and accurate situation related to assessment literacy studies to ensure that the developed instrument becomes an appropriate tool to test the level of TeCAL.

Therefore, the main objective of this study is to develop the assessment literacy instrument for primary school teachers in the context of classroom assessment based on the constructs and subconstructs obtained through document analysis that had been conducted. It involves the system model of the literature review with three levels and four phases. Four constructs and 19 subconstructs have been identified with explicit operational definitions and utilized as the foundation for developing the teacher assessment literacy instruments for classroom assessment.

**METHODOLOGY**

A qualitative approach is used in this study to analyze documents related to assessment literacy and classroom assessment. Bowen (2009) stated that the implementation of document analysis studies is an effective qualitative research method that incorporates systematized processes for analyzing

and reviewing documents obtained from printed and electronic sources. Same as other qualitative research methodologies, document analysis requires the data to be analyzed before being interpreted and given meaning and understanding in developing empirical knowledge (Corbin & Strauss, 2008). According to Burns and Grove (1993), the literature review is one of the sources that can increase the content validity of a study conducted. In this study, the system model of the literature review, as suggested by Gray et al. (2017), i.e., input, throughput, and output (Figure 1), is applied. The system model is divided into Input: Phase 1, Throughput: Phases 2 to 3, and Output: Phase 4.

Besides, Bowen (2009) also stated that various documents could be used in a systematic evaluation. However, in this study, only document analysis of previous research articles, standard modules, and official reference documents/manuals was conducted. All these electronic source documents are accessed and obtained online, provided the internet network is available. Furthermore, analytical procedures are implemented as suggested by Labuschagne

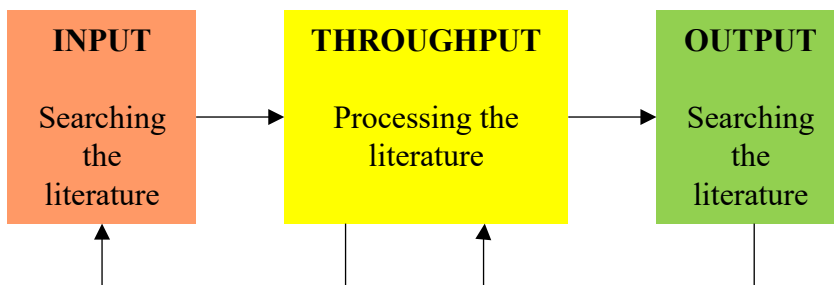


Figure 1. The system model of the literature review (Gray et al., 2017)

(2003), Linneberg and Korsgaard (2019), which include steps to finding and selecting documents before evaluating (understanding) and synthesizing the required data. These data are then compiled into themes or categories to be used as the main constructs and subconstructs in constructing the teacher classroom assessment literacy (TeCAL) instrument in this study. This study focuses only on the basic components of teacher literacy as a knowledge domain and does not involve other components.

## RESULT AND DISCUSSION

This study focuses on questions based on the objective of this study to identify constructs and subconstructs for primary school teacher assessment classroom literacy (TeCAL) instrument in the context of classroom assessment based on thematic analysis of the literature review. All the identified constructs and subconstructs are based on the domain knowledge of classroom classification literature using three levels with four phases as follows:

### Input Level

#### Phase 1: Familiarizing with the Data

At the input level, the researcher carried out the process of finding literature materials online, namely electronic resources using certain keywords, such as “classroom assessment literacy,” “assessment literacy,” or “classroom assessment”. Correct keywords can filter related articles more accurately and quickly (DeCarlo, 2018). Among the articles that are identified to meet

the requirements of the study are conducted and reported by the following researchers, DeLuca et al. (2015, 2016, 2019), F. H. N. Muhammad and Bardakci (2019), Jawhar and Subahi (2020), N. Muhammad et al. (2020), Lian et al. (2014), Yamtim and Wongwanich (2014), Levy-Vered and Alhija (2015), H. Xu (2017), Y. Xu and Brown (2016), Zolfaghari and Ahmadi (2016), and Popham (2009, 2011). In this step, the standard documents, namely Classroom Assessment Standard (Klinger et al., 2015) and the Teacher Classroom Implementation Guide (CDD, 2019), are identified as the main reference for this study. Researchers need to familiarize themselves with the data obtained from this article as the first phase of this study.

Among the findings in this first step, the literature review conducted by DeLuca et al. (2015) and Y. Xu and Brown (2016) showed that many standards are being built around the world depending on the educational needs of their citizens’ respective countries. This reference is the main guide for teachers in planning and implementing the classroom assessment process. Nevertheless, the findings indicated that most previous researchers referred to Standards for Teacher Competency of Educational Assessment of Students (STECAS) issued in 1990 by the American Federation of Teachers et al. (1990). Among them are Jawhar and Subahi (2020), N. Muhammad et al. (2020), F. H. N. Muhammad and Bardakci (2019), and Yamtim and Wongwanich (2014). There are seven main standards proposed by STECAS that are relevant

in terms of the teacher's skill and ability: (1) choosing assessment methods that are appropriate for instructional decisions, (2) developing assessment methods that are appropriate for instructional decisions, (3) administering, scoring, and interpreting the results of both assessment methods, (4) using the assessment results when making decisions about individual students, planning to teach, developing curriculum, and school improvement, (5) developing valid grading procedures to assess students, (6) communicating assessment results to students, parents, and other educators, and (7) recognizing unethical, illegal, and otherwise inappropriate assessment methods and uses of assessment information.

In 2015, The Joint Committee on Standards for Educational Evaluation (JCSEE), together with 16 professional bodies in the academic field, issued an official document as a reference for classroom assessment known as Classroom Assessment Standard (CAS), which is more up-to-date and comprehensive (Klinger et al., 2015). There are 16 standards with three themes proposed in CAS: Foundations, Use, and Quality. The first theme, Foundation, consists of Assessment Purpose, Learning Expectations, Assessment Design, Student Engagement in Assessment, Assessment Preparation, and Informed Students and Parents/Guardians. The second theme, Use, consists of five standards: Analysis of Student Performance, Effective Feedback, Instructional Follow-Up, Grades and Summary Comments, and Reporting. Finally, the third theme, Quality, comprises

five standards: Cultural and Linguistic Diversity, Exceptionality and Special Education, Unbiased and Fair Assessment, Reliability/Validity, and Reflection. Based on the literature review, only studies by Christopher DeLuca incorporated the CAS references in their research (DeLuca et al., 2015, 2016, 2019).

In Malaysia, the Curriculum Development Division (CDD) under MoE has developed its standard known as the Teacher Classroom Implementation Guide as the main reference for teachers when implementing classroom assessment in schools (CDD, 2019). Standards are necessary for teachers to make references in helping students meet the requirements of the set criteria, assess the quality of student work and arrange things that students need to do during the learning process (Sadler, 1989). This standard provides the guidelines for implementing assessment in the classroom that effectively begins with planning teaching, learning, and assessment methods; implementation of teaching, learning, and assessment; recording and analyzing students' dominance; and reporting the level of dominance of the students. In addition, follow-up actions are also focused on increasing the level of students' mastery, professional judgment, and moderation, as well as nine main features of the classroom assessment planned by the teachers: systematic, formative, and summative forms, use of various methods, criteria based, emphasizes individual development, to track the development of learning thoroughly, enabling follow-

up actions, and promoting self- and peer assessments (CDD, 2019). These features cater to the characteristics of 21<sup>st</sup>-century assessments, which should be continuous, consisting of assessment as learning (AaL), assessment for learning (AfL), and assessment of learning (AoL; Md Said, 2018) as well as the characteristics of high order thinking skills (HOTS) items, i.e., real-life situations, non-repetitive items, stimuli, task words, and unusual contexts (CDD, 2014).

### **Throughput Level**

#### **Phase 2: Generating Initial Codes**

The second step in the model is the Throughput step, where researchers conduct a detailed analysis of documents related to TeCAL to examine whether the data obtained are “saturated” to indicate no new information/themes (Guest et al., 2006) and whether the same theme continues to be repeated (Morse et al., 2002). The same information from different researchers or sources is coded to see patterns that can be formed and show the perspective and focus of studies conducted by previous researchers. Coding is usually the most basic form of symbols, such as a phrase or short words that carry a specific meaning segment, such as a prominent attribute, captures the essence, or represents some of the language-based or visual data in the researcher’s data set (Saldana, 2013). Thus, the researcher has analyzed all the documents/articles of previous researchers to identify the prominent attributes and the essence of their study related to assessment literacy

described in the form of phrases or words that they often use. It can translate raw data into findings based on the objectives of the study conducted (Linneberg & Korsgaard, 2019).

Researchers have used deductive coding methods, which are more focused on issues generally known in the literature besides being enshrined in developing existing theories, as stated by Linneberg and Korsgaard (2019). Thus, in this study, all codes that have been obtained from the analysis of previous researchers have been grouped based on the definition of the concept of classroom assessment literacy by H. Xu (2017), which described it as the knowledge and capacity of teachers to undertake classroom assessment for the aim of continuous improvement, including a continuous process to gather information on individual’s growth and efficiency of teaching and learning, to obtain information, interpret information, make inferences and make decisions about what needs to be done to improve the learning of the students.

The first coding cycle is done based on analysis using information-centered terms in general, as suggested by Gioia et al. (2013), with code coloring technique, as suggested by Linneberg and Korsgaard (2019). This technique was chosen due to the limited data obtained and because it is not too complex. In addition, this step can provide the latest overview based on complex information from previous researchers (DeCarlo, 2018). Findings from the analysis of all documents/articles include some codes: Purpose/Goal/Objective, Important/Necessity of assessment, Concept/

Method, Planning/Procedure/Choosing Assessment, Assessment Construction, Assessment Design/Method, Administration of Assessment/ Process/Implementing, Measurement theory/Validity/Reliability, Grading/Scoring Procedure, Information/Result Analysis/Record/Collect, Interpretation, Communications/Evidence/Comment/Clear standard terms, Use information/Making Decision; Ethics/fairness/Bias/Professional Judgement, Report/Feedback to stakeholder, and Reflection/Follow-up Action (Figure 2).

### Phase 3: Defining and Naming Themes

After the initial code generation step, the next process is to classify the codes to identify the appropriate themes to represent these codes (Saldana, 2013). In this phase, the appropriate theme label is determined based on the groups of codes that are identified. This process allows researchers to narrow the number of codes to smaller themes or groups (Linneberg & Korsgaard, 2019). It involves the second cycle of encoding more researcher-centered, i.e., concepts, themes, and dimensions of the study that need to be emphasized to a higher abstraction level (Gioia et al., 2013). This more detailed and complex step requires researchers to consider different themes or types (Linneberg & Korsgaard, 2019). As stated by DeCarlo (2018), it requires careful attention to the level of conceptual measurement and its dimensions.

Linneberg and Korsgaard (2019) suggested that at this stage, the researcher should use some theories or concepts related to the phenomenon of the study conducted

as a deductive analysis. Thus, according to McMillan (2011), four themes (constructs) of assessment literacy are formed: Purpose, Measurement, Evaluation, and Use in the implementation of classroom assessments, which are (1) Purpose is to explain the specific purpose of collecting information either before (AfL), during (AaL) or after (AoL), (2) Measurement is the systematic process of setting numbers for differentiated behaviors and performance or behaviors using a variety of techniques, (3) Evaluation is the process of placing several levels of value on different numbers and observations based on a specific reference framework, and (4) Use is the last stage of performing an assessment that refers to how the assessment is used. Based on these definitions, the themes are coded and grouped into four groups (Table 1). Then, these codes are tested using fit statistical analysis in the measurement model to ensure the validity of the constructs in the themes used. If this code is found to be statistically appropriate, it will be retained under that theme or otherwise excluded. However, in this study, all codes met the required fit statistical analysis.

This study focuses on classroom assessment literacy; hence, all document analyses are discussed in the “throughput process” as a conceptualization process to identify related themes. These four themes are then used as the criteria for analyzing the CAS document in the next step (Klinger et al., 2015), while Classroom Assessment Implementation Guide (CDD, 2019) is used as the main reference in this study. Although it has not been explicitly mentioned by

Author	Relevant / Type	Construct & Subconstruct
Jahar and Subahi (2020)	Choosing appropriate assessment method for instructional decisions. Interpreting in higher education	Administrative scoring and interpreting the result. Using assessment results when making decisions
N. Muhammad et al. (2020)	Choosing appropriate assessment method for instructional decisions. Technical teachers	Administrative scoring and interpreting the result. Using assessment results when making decisions
CCD (2019)	Planning instructional & assessment methods Standard	Record & analyze student mastery Developing valid pupil grading procedures that used student assessment.
Dalaca et al. (2019)	Assessment Purposes Teacher candidates	Assessment Process Equitable
F. H. N. Muhammad and Burdaka (2019)	Developing an appropriate method of assessment Secondary & preparatory school teacher	Assessment Process Standard
H. Xu (2017)	Method or technique EFL Teacher of High School	Using assessment results for decision making Developing valid grading practices
Dalaca et al. (2016)	Assessment of Learning North America Teacher	Assessment Process Equitable
Y. Yu and Brown (2016)	Disciplinary Knowledge & Pedagogical Content Knowledge S.L.R. Model T.A.L.P	Assessment Process Standard
Zohghani and Almasri (2016)	Assessment Method High school teachers	Assessment Process Knowledge of assessment & communication
Dalaca et al. (2015)	Factors enhancing the quality of assessment S.L.R	Assessment Process Knowledge of assessment & communication
Leyva-Veal and Alpar (2015)	Matching to purpose Teacher Training Colleges	Assessment Process Assessment resources
Künger et al. (2015)	Learning Expectations CAS Standard	Assessment Process Assessment resources
Yanin and Wongwanich (2014)	Choosing appropriate assessment method for instructional decisions. Primary school teachers	Assessment Process Using assessment results when making decisions
Lin et al. (2014)	Validity of assessment General Article	Assessment Process Transparency of assessment
Bellars (2013)	Assessment Purposes Policy	Assessment Process Assessment resources
Popham (2011)	Reliability General Article	Assessment Process Assessment resources
Popham (2009)	The fundamental function of educational assessment namely; the collection of evidence General Article	Assessment Process Assessment resources

Figure 2. Meta-analysis construct and sub-construct



Indicator: *Coding the Data*




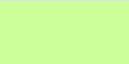




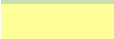







Color	Description	Color	Description
	: Purpose/Goal/Objective		: Grading/Scoring procedure
	: Important/Necessity of assessment		: Information/Result analysis/Record/Collect
	: Concept/Method		: Interpretation
	: Planning/Procedure/Choosing assessment		: Communications/Evidence/Comment/Clear standard terms
	: Assessment construction		: Use information/Making decision
	: Assessment design/Method		: Ethics/fairness/Bias/Professional judgement
	: Administration of assessment/Process/Implementing		: Report/Feedback to stakeholder
	: Measurement theory/Validity/Reliability		: Reflection/Follow-up action

Table 1

*Distribution of codes based on themes*

<b>Group 1: Purpose</b>	<b>Group 2: Measurement</b>	<b>Group 3: Evaluation</b>	<b>Group 4: Use</b>
Purpose/Goal/Objective	Assessment Construction	Grading/Scoring Procedure	Use information/Making decision
Important Necessity of assessment	Assessment Design/Method	Information/Result Analysis/Record/Collect	Report/Feedback to stakeholder
Concept/Method	Administration of Assessment/ Process/Implementing	Interpretation	Reflection/Follow-up Action
Planning/Procedure/Choosing Assessment	Measurement theory/Validity/Reliability	Communications/Evidence/Comment/Clear standard terms Ethics/fairness/Bias /Professional Judgement	

prior researchers, classroom assessment in the 21st century (student-centered) is also connected to high-order thinking skills (HOTS). Besides the nine classroom assessment features, only subthemes under

the main themes are included as added values onto constructs and subconstructs for use (CDD, 2019). All of these constructs and subconstructs are measured and are clearly stated in the form of conceptual definitions,

translated into operational forms through the construction of statements or items that can measure the constructs, as suggested by Kline (2015). These constructs and subconstructs are the main output of this study.

## Output Level

### Phase 4: Producing Report

The result of the analysis of this document is to produce the study output. Four constructs and 19 subconstructs are identified and clearly defined operations in phase five before being used as the basis for developing teacher assessment literacy instruments in the context of classroom assessment. The following are the definitions of operations that are identified:

#### *Purpose Component.*

According to McMillan (2011), the first step in classroom assessment (CA) is to explain the specific purpose of collecting information before, during, or after learning. Goals need to be set to determine the next step, such as what form of assessment is needed, how to administer and grade the assessments, and how the results can assist in improvements.

This study aims to provide teachers' CA literacy focus in planning teaching, learning, and building assessment instruments (CDD, 2019). It involves three components, which are the ability to do the following:

1. Determine CA objectives, assessment as learning (AaL), assessment for learning (AfL),

and assessment of learning (AoL) objectives.

2. Relate content and learning standards with a clear statement in performance standards; that is what students should learn in AaL, AfL, and AoL.
3. Provide information on the purpose and use of CA: AaL, AfL, and AoL, to students and parents/guardians.

#### *Measurement Component.*

Measurement is the systematic action of allocating numbers to behavior and performance (McMillan, 2011). It is a process in which traits, characteristics, or behaviors are distinguished numerically. Various methods can be applied to measure the nature or target of specified learning. According to the CDD (2019), this process can be implemented continuously in teaching and learning using (1) oral, (2) written, and (3) observation methods.

This study's measurement process focuses on teacher-classroom assessment (CA) literacy in implementing teaching, learning, and assessment (CDD, 2019). It involves seven components, which are the ability to do the following:

1. Categorize the types, various designs, and methods of CA: assessment as learning (AaL), assessment for learning (AfL), and assessment of learning (AoL).
2. Using the characteristics of HOTS items: real situations in daily life,

non-recurring items, stimuli, task words, and contexts that are not common.

3. Encourage students to participate in CA activities actively and meaningfully by supporting self and peer assessments: giving and receiving feedback based on criteria.
4. Planning CA preparation: time, resources, and opportunities.
5. Explain the ethics and its effects in implementing and making CA decisions that should not be influenced by factors unrelated to the purpose of the intended assessment.
6. Explain the characteristics of validity in CA, which should provide information that supports accurate decisions about the knowledge and skills of each student.
7. Explain the characteristics of reliability in CA, which should provide consistent and reliable information that supports accurate decisions about the knowledge and skills of each student.

#### ***Evaluation Component.***

Evaluation places several levels of value on different numbers and descriptions based on a specific reference framework (McMillan, 2011). It also involves a process of judging involving quality (teacher professional

judgment), the interpretation collected through measurement, and emphasis on criteria, which are specific behavior or dimensions that are proven to fulfill the standards successfully. The teacher's expectations are communicated to the students through criteria and standards.

This study's evaluation process focuses on teacher classroom assessment (CA) literacy in recording results and analyzing students' assessment information (CDD, 2019). It involves four components, which are the ability to do the following:

1. Explain the analysis of learning evidence used based on criteria and performance standards in CA.
2. Record and characterize students' knowledge and skills development before, during, and after learning.
3. Characterize grades, overall mastery level, and CA: assessment of learning (AoL) comments on student achievement of learning expectations.
4. Explain professional considerations and discussions in providing CA (AoL) grades and reviews.

#### ***Use Component.***

The final stage of implementing classroom assessment (CA) is how assessment is used (McMillan, 2011). Test scores and other information are closely related to making the decisions teachers need to implement effective teaching for assessment purposes

and the needs of students and parents. This decision depends on when it was made. McMillan (2011) categorized it into (1) diagnosis, (2) grading, and (3) instruction.

Use in this study refers to the focus on the CA literacy of teachers in reporting and follow-up action (CDD, 2019). It involves five components, which are the ability to do the following:

1. Explain CA as a timely response.
2. Plan instructions and provide the next steps to support continuous student learning as a follow-up action assessment for learning (AfL) and assessment as learning (AaL).
3. Prepare/record the results of formal reports- assessment of learning (AoL).
4. Provide comments and support summative values (AoL) that emphasize individual development.
5. Explain the practice of reflection on quality assurance and the effectiveness of CA implementation.

## CONCLUSION

Previous researchers emphasized that teacher assessment literacy is vital to the primary interconnection between assessment quality, teaching, and student achievement. Its effectiveness can influence educational decisions, such as improving the quality of teaching and learning that drives expected achievement by measuring, analyzing, interpreting, and using student performance

data to identify learning needs. Thus, this study contributes to identifying constructs and subconstructs often used by previous researchers when discussing assessment literacy and CA in their studies. Identifying the constructs and subconstructs of teacher assessment literacy in CA is important, especially before constructing instruments, to ensure that researchers can measure based on correct and accurate constructs at once is expected to improve the quality of teachers to support the teaching and learning process in schools. Qualitative document analysis is the first step to ensure that the constructs and subconstructs used in the instrument are appropriate and valid.

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