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Development of teachers' teaching assessment form according to visible learning theory

Rungson Chomeya, Apantee Poonputta*, Auttapon Intasena, Araya Piyakun

Faculty of Education, Mahasarakham University, Mahasarakham 44000, Thailand

Article Info

Abstract

The present research aimed at constructing and examining the teacher's teaching assessment form according to Visible Learning theory. Its validity, discrimination, and reliability were analyzed. The samples of the study were 5 experts, 100 teachers for a tryout, and 300 teachers for field study experiment. The instrument was a 42-item teacher's teaching assessment form based on Visible Learning principle. The reliability value of the form obtained from the tryout was 0.90. The collected data were analyzed using Factor Analysis, item-total-correlation, Index of item objective congruence (IOC), and Cronbach's Alpha Coefficient methods. The results revealed that the IOC of the constructed teacher's teaching assessment form was between 0.80 and 1.00. The Initial Eigenvalues Total was between 0.93 and 14.06, the variance components were 33.49 percent, 21.72 percent, 5.28 percent, 3.09 percent, 2.68 percent, and 2.21 percent, respectively, and the Total Cumulative % was 68.46 percent. The number of the components responded to the theory with the Item Total Correlation Coefficient of between 0.33 and 0.68, which was higher than the standard criteria. Finally, the Cronbach's Alpha Coefficient was 0.94 and was considered at the excellent level.

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Introduction

The Teacher's Teaching Assessment Form is intricately designed in accordance with the six foundational principles derived from Visible Learning theory, as elucidated by Hattie (2015). Visible Learning is a comprehensive approach aimed at imbuing all learning experiences with meaningful connections to everyday applications, promoting self-regulated learning wherein students actively engage, adapt, and remain cognizant of social changes in their learning journey. As Chomeya (2019) emphasizes, Visible Learning encompasses various components, including students, homes, schools, curricula, teachers, and teaching strategies, all of which are integral to its realization. By integrating these principles into the assessment form, educators can systematically evaluate teaching effectiveness

across multiple dimensions. For instance, prioritizing positive Teacher-Student Relationships aligns with Visible Learning's emphasis on creating supportive learning environments conducive to student engagement and motivation. Adhering to the principles of Visible Learning in teaching assessment can cultivate high-quality teaching practices that optimize student learning outcomes and foster a culture of continuous improvement in education.

According to the principles of Visible Learning theory (Hattie, 2015), the Teacher's Teaching Assessment Form comprises six fundamental components designed to evaluate teaching effectiveness. These components include fostering a positive Teacher-Student Relationship, employing Socratic Teaching methods to encourage critical thinking and dialogue, promoting a Growth Mindset among students to cultivate resilience and a willingness to embrace challenges, ensuring Inclusion of all students by catering to diverse learning needs and styles, facilitating Parental Involvement to create a supportive learning environment beyond the classroom, and implementing Peer Tutoring to encourage collaborative learning and peer support. The development of this assessment form involved rigorous scrutiny and validation by experts to ensure its alignment with the research objectives and comprehensive coverage of relevant content

In visible learning, teachers learn the principles that make students successful, are well aware of the changes, motivate students to perform their jobs and live their lives potently compared to students in other countries internationally. Therefore, getting the empirical data that reflect teachers' teaching performance is crucial, and it needs development. The teachers' teaching assessment framework developed in line with the Visible Learning principle can be used to examine and assess teachers' competency in teaching. When teachers employ the standard teaching assessment framework constructed through meticulous quality inspection, their teaching competency would be impacted leading to the promotion and development of teacher's teaching abilities in all six aspects, according to the principle of Visible Learning.

From the research and documents related to teaching management that follows Visible Learning theory, such demonstrates that the assessment framework for assessing teachers' teaching has not been constructed. The assessment framework would be utilized to reflect the teachers' teaching competency and demonstrate their strengths and weaknesses as well as interpreting the norms for teacher's teaching assessment form. The researchers, therefore, aimed at developing the

teacher's teaching assessment form based on the theory of Visible Learning. The purpose was to construct a qualified assessment form together with the criteria for consideration and interpretation in order to show the teacher's teaching improvement and be guidelines for promoting and supporting their potential for concrete teaching development. The findings of the study would be fundamental data for improvement plans for teachers. Not only is it great knowledge for professional teachers and student teachers, but it is also a construction of body of knowledge, concepts, and research development for future practice and concrete improvement.

Purpose of the Research

The purpose of the research was to construct and examine the quality of teacher's teaching assessment form within the framework of Visible Learning theory including the examination of its validity, discrimination, and reliability.

Literature Review

There is a current focus on the development and measurement of twenty-first century skills. This search has been conducted for millennia at least since Socrates, Plato, and Aristotle. Socratic questioning, probing questions, seeking evidences, closely examining, reasoning and assumptions, tracing implications, searching for unintended consequences, and appealing to logical consistency are still used. In these days of 'false news', Socrates would have been exemplary in carefully distinguishing those beliefs that are reasonable and logical from those that lack evidence and rational foundation to warrant our belief (Illeris, 2018).

Visible Learning is an approach presented by Hattie (2012), an educational researcher from University of Auckland, New Zealand. It is regarded as a contemporary theory of learning called a model of learning optimizing the effectiveness of learning strategies (Illeris, 2018). The concept of visible learning is a result of 15 years of research, and it is the most influential research study. The curriculum and teaching under this principle are very popular at the present time (Knight, 2019). Visible learning occurs when there are good interactions between teachers and students (Hattie, 2008). It is believed that interactions have more impact on students' success in learning than educational technology or teachers' qualifications. The concept is a result of more than 50,000 synthesized educational studies worldwide (Hattie, 2015)

in order to answer the question of what guarantees the success of students learning in school systems (Fisher et al., 2016). Good connections or relationships between students and teachers are the key to students' learning achievements (Hattie, 2013, pp. 16–26) because it is one of the best interventions for learning. In doing this, positive feedback is provided and it has an effect on students' metacognitive strategies. The teachers apply the Socratic teaching method to foster students' critical thinking and develop the growth mindsets of both teachers and learners. It is known that the growth mindset is one of the important psychological factors to people at the present time and in the future (Dweck, 2006). The six factors affecting visible learning comprise students, homes, schools, curriculum, teachers, and teaching strategies.

Most modern theories of motivation assume a student needs to be 'pulled or pushed' such as wanting to master or competing with one's peers. An alternative and more defensible basis of motivation is the notion of striving: recognizing that life does not stand still, and the learner will be 'moving forward' in any event, the important motivation question becomes 'will I do this or that' (Hodis et al., 2016). These striving theories of motivation have a higher chance of explaining why students engage in one activity or an alternative (e.g. on or off task). (Illeris, 2018). Success criteria as important as the exploration of learning strategies themselves is the study of the mediators of those strategies. A major mediator is the degree to which the learner is aware of the criteria of success of the learning, along with the value they place on attaining these success criteria. Some students will engage in most activities regardless; indeed, teachers value such compliant students. Students' behaviors become more goal-directed when they are aware of what it means to be successful before undertaking the task. Students who can articulate or are taught these success criteria are more likely to be strategic in their choice of learning strategies, more likely to enjoy the thrill of success in learning, and more likely to reinvest in attaining the criteria of success (Illeris, 2018).

Scholars (e.g., Al-Abdullatif & Alsaeed, 2019; Hattie, 2015; Havnes et al., 2012; Valeria & Bîrnaz, 2023; Wright, 2020) have extensively explored visible learning as an innovative approach to teaching and learning. Previous research indicates that visible learning is widely endorsed as an effective method across various fields, including mathematics (Al-Abdullatif & Alsaeed, 2019; Wright, 2020) and psychology (Hattie, 2015). However, the majority of studies primarily advocate for the implementation of these principles in the classroom setting. Notably, Valeria and Bîrnaz (2023) are among the few who have focused on evaluating teachers' adoption of visible learning principles. However, their study primarily presents the principles for self-assessment within the visible learning framework. To date, there is a notable absence of research addressing the development of teacher assessment methodologies aligned with the principles of visible learning. Thus, our aim is to bridge this gap by proposing such a framework to enhance the assessment of teachers' adherence to visible learning principles. This initiative would be beneficial for educational institutions, administrators, and policymakers seeking to cultivate a teaching culture that maximizes student learning outcomes. By providing a structured methodology for evaluating teachers' implementation of visible learning strategies, our framework aims to facilitate continuous improvement in teaching practices and ultimately enhance student engagement and achievement, as illustrated in Figure 1.
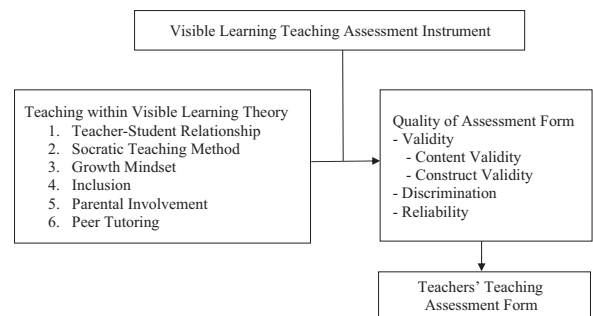
Figure 1 Research framework

Methodology

Scope of the Research

1. There were 5 experts altogether in the fields of Curriculum and Instruction, Psychology, Research, and Education who considered and provided suggestions toward teachers' teaching assessment form within Visible Learning theory.

2. The population of the study was 808 teachers of the Enrichment Program in northeast Thailand who officially started teaching in 2021 from 9 provinces, namely, Ubon Ratchathani, Amnat Charoen, Srisaket, Roi Et, Yasothon, Buriram, Surin, Nakhon Ratchasima, and Maha Sarakham.

3. The study samples for the first tryout were 100 teachers of the Enrichment Program in northeast Thailand who officially started teaching in 2021.

4. The samples for the field study experiment were 300 teachers of the Enrichment Program in northeast Thailand who officially started teaching in 2021. The sample size was determined using Tabachnick and Fidell's criterion of factor analysis (2012) which states that researchers had to consider each condition carefully when determining the sample size and was proposed by Comrey and Lee in 1992 (Tabachnick and Fidell, 2007). The following scale of sample size adequacy was provided: 50 was considered very poor, 100 – poor, 200 – fair, 300 – good, 500 – very good, and 1,000 or more – excellent. However, Denis (2021) proposed that 300 samples or more were the minimum size for suitable factor analysis.

5. The methodology of the present research was a quantitative research design.

Research Instrument

According to Visible Learning theory, the framework of the Teacher's Teaching Assessment Form consisted of six components, namely, (1) Teacher-Student Relationship, (2) Socratic Teaching, (3) Growth Mindset, (4) Inclusion, (5) Parental Involvement, and (6) Peer Tutoring. The constructed assessment form was inspected and approved by the experts in terms of content completion within the research purposes.

The Teacher's Teaching Assessment Form constructed within Visible Learning approach was a 5-point rating scale form with 42 items. From the definitions of the factors, the constructed form measured all six components, and there were seven items for each one. As stated, the form had been examined for its content validity, language accuracy, and expressions in accordance with structured group discussion. It was also checked by the five experts for whether it followed the definitions of theories related to education and whether it was appropriate for the purposes of the study. The items with the IOC of 0.50–1.00 were selected for examination. Then, the assessment form was tested for discrimination values before they carried out the tryout with 100 teachers of the Enrichment Program who were not the study samples. The results of the tryout were analyzed using t-test by selecting the items with statistical significance which show that the instrument had discrimination capability (Mclver & Carmines, 1981). The items that had Item Total Correlation of more than .02 and statistical significance of .05 or more should be chosen (Gravetter et al., 2021). According to the results of the tryout of the present study, the Item Total Correlation was between 0.23 and 0.57 and the values were in line with the criteria. For the constructed assessment form's reliability, the Conbrach's Alpha technique was employed. The criteria for interpretation were as follows: 0.9 or more was considered excellent, 0.8 – good, 0.7 – acceptable, 0.6 – questionable, 0.5 – poor, and lower than 0.5 was unacceptable or had no reliability at all (George & Mallery, 2020). For the constructed assessment form, the reliability was obtained at 0.90, which was considered excellent according to the given criteria.

Data Collection

The data were collected by the researchers. 100 constructed assessment forms were sent to the samples for the first tryout in order to examine the discrimination and validity. For the second experiment, the teacher's teaching assessment forms were sent to 300 samples using Google Form and the time limit for completing the form was 30 minutes.

Data Analysis

To analyze the content validity of the constructed form, the researchers made the experts' opinions and suggestions at their standard by maintaining the original contents, definitions, and intentions within Visible Learning theory as much as possible. The changes were made when it was necessary or for smooth reading only. However, if the meaning was lost, the researchers used other skills to keep the content the same (Creswell, 2016). The purpose for this step was to discover the useful meanings for the analysis and inspection of the analyzed data. The interpretation of the wordings in the assessment form might be subjective or biased; therefore, to prevent these from happening, the 5 experts were requested to inspect the results of the analyzed data. Also, the construct validity was analyzed using factor analysis technique by considering the Initial Eigenvalues for the component factors (Tabachnick & Fidell, 2014). This was used to examine how well a test measured the concept it was designed to evaluate. Moreover, the Item Total Correlation Coefficient was employed for the analysis of discrimination and Cronbach's Alpha was used for reliability analysis.

Results

The findings of the construction and examination of the teacher's teaching assessment form within the Visible Learning theory are as follows:

The Results of the Tryout

1. It was found that the content validity of the 42-item assessment form was approved by the 5 experts with the IOC of 0.80–1.00.

2. The discrimination and validity of the 42-item assessment form from 100 samples is between 0.23 and 0.57. The obtained values are in line with the criteria and appropriate for further experiment. (Table 1).

3. The reliability of the constructed assessment form is 0.90, which is considered excellent. The reliability of Teacher-Student Relationship component is 0.70, Socratic Teaching –0.70, Growth Mindset –0.80, Inclusion –0.71, Parental Involvement –0.75, and Peer Tutoring –0.76. Almost all components have acceptable reliability values, except for the Growth Mindset component, which is at a good level. It can be stated that the whole assessment's reliability is acceptable and appropriate for further experiment (Table 1).

Research Results of Field Study Experiment

1. The construct validity of the 42-item assessment form showing results of each component is illustrated in Table 2. The factor loading of all 6 components of the constructed assessment form was obtained from 300 samples. The results reveal that the Initial Eigenvalues Total are between 0.93 and 14.06, the component percent of Variance values are, 33.49, 21.72, 5.28, 3.09, 2.68. 2.21 percent, respectively, and the total Cumulative percent is 68.46 percent.

2. The discrimination and validity of the 42-item assessment form from 300 samples is between 0.33 and 0.68. The obtained values are in line with the criteria and appropriate for further use (Table 3).

Table 1 Discrimination (Item total correlation coefficient) by item and reliability (Cronbach's Alpha Coefficient) by component and the whole form from the Tryout

Component	Item	Item Total Correlation Coefficient	Cronbach's Alpha Coefficient
Teacher-Student Relationship	1–7	0.45, 0.35, 0.47, 0.47, 0.27. 0.44, 0.33	.70
Socratic Teaching	6–14	0.39, 0.44, 0.37, 0.50, 0.38, 0.43, 0.41	.70
Growth Mindset	15–21	0.45, 0.41, 0.48, 0.44, 0.50, 0.50, 0.42	.80
Inclusion	22–28	0.44, 0.49, 0.47, 0.39, 0.27, 0.20, 0.35	.71
Parental Involvement	29–35	0.35, 0.35, 0.47, 0.49, 0.57, 0.35, 0.45	.75
Peer Tutoring	36–42	0.39, 0.48, 0.41, 0.45, 0.39, 0.45, 0.23	.76
Visible Learning	1–42	0.23–0.57	.90

Table 2 Results of factor analysis for construct validity

Com ponent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.06	33.49	33.49	14.06	33.49	33.49	10.06	23.96	23.96
2	9.12	21.72	55.21	9.12	21.72	55.21	9.93	23.63	47.59
3	2.22	5.28	60.49	2.22	5.28	60.49	4.33	10.31	57.90
4	1.30	3.09	63.58	1.30	3.09	63.58	1.86	4.43	62.33
5	1.12	2.68	66.26	1.12	2.68	66.26	1.42	3.38	65.71
6	0.93	2.21	68.46	0.93	2.21	68.46	1.15	2.75	68.46

Table 3 Discrimination (Item total correlation coefficient) by item and reliability (Cronbach's alpha coefficient) by component and the whole form from the second experiment

Component	Item	Item Total Correlation Coefficient	Cronbach's Alpha Coefficient
Teacher-Student Relationship	1–77	0.55, 0.32, 0.54, 0.52, 0.37, 0.53, 0.42	0.78
Socratic Teaching	614	0.42, 0.41, 0.39, 0.61, 0.66, 0.47, 0.61	0.74
Growth Mindset	1521	0.46, 0.45, 0.47, 0.68, 0.47, 0.53, 0.41	0.78
Inclusion	2228	0.42, 0.50, 0.55, 0.65, 0.47, 0.46, 0.63	0.73
Parental Involvement	2935	0.46, 0.42, 0.68, 0.57, 0.60, 0.63, 0.56	0.79
Peer Tutoring	3642	0.67, 0.68, 0.65, 0.67, 0.39, 0.62, 0.38	0.87
Visible Learning	142	0.32–0.68	0.94

3. The reliability of the constructed assessment form is 0.94 which is considered at the excellent level. When each component is studied, it shows that the reliability of Teacher-Student Relationship component is 0.78, Socratic Teaching –0.74, Growth Mindset –0.78, Inclusion –0.73, Parental Involvement –0.79, and Peer Tutoring –0.87. Almost all components have acceptable reliability values, except for the Peer Tutoring component which is at good level. It can be concluded that the whole assessment form has acceptable reliability and is appropriate for use (Table 3).

Discussions

The study was to construct the Teacher's Teaching Assessment Form according to Visible Learning Theory. The form consisted of 6 components, namely, Teacher-Student Relationship, Socratic Teaching, Growth Mindset, Inclusion, Parental Involvement, and Peer Tutoring. There were 7 items (questions) in each component and 42 items altogether. All questions were constructed and based on Hattie's Visible Learning Theory (2012). As stated by Illeris (2018), teaching through visible learning approach helped promote student learning strategies (2018). The items in the assessment form were constructed from the situations similar to the ones that teachers might experience in the classrooms in order for them to choose the answers that most matched with their behaviors. For the content validity of the constructed form by analyzing the IOC between the operational definitions and the questions from 5 experts, such showed that the IOC of all 42 items was between 0.80 and 1.00. It was because the assessment form was constructed and based on Visible Learning Theory. The contents were the situations that the teachers might deal with in the classrooms. The construct validity of the form through factor analysis technique revealed that the Initial Eigenvalues Total was 0.93–14.06, component % of Variance were 33.49 percent, 21.72 percent, 5.28 percent, 3.09 percent, 2.68 percent, 2.21 percent, respectively. Lastly, the total cumulative % was 68.46 percent. The number of components conformed with the theory as the obtained factor loading of all variables was positive and statistically significant at .05. For the discrimination and reliability values of all 42 items of the constructed assessment form from 300 samples in the field study, it was found that all questions were within the discrimination criteria. The Item Total Correlation Coefficient was between 0.33 and 0.68, which were higher than the standard criteria (Gravetter et al., 2021). The Cronbach's Alpha Coefficient was 0.94, which was at

an excellent level according to George and Mally (2020).

The Teacher's Teaching Assessment Form is therefore intricately designed in accordance with the six foundational principles derived from Visible Learning theory. These principles encompass fostering positive Teacher-Student Relationships, implementing Socratic Teaching methods, promoting a Growth Mindset, ensuring Inclusion, facilitating Parental Involvement, and encouraging Peer Tutoring. Each component of this assessment form serves as a holistic measure to evaluate teaching effectiveness across various dimensions. By adhering to these principles, educators can create a classroom environment that is conducive to optimal learning outcomes. For instance, prioritizing a positive Teacher-Student Relationship fosters trust and engagement, while incorporating Socratic Teaching encourages critical thinking and active participation. Moreover, promoting a Growth Mindset instills resilience and a positive attitude towards learning challenges. Additionally, the emphasis on Inclusion ensures that diverse learning needs are addressed, while Parental Involvement and Peer Tutoring foster a supportive and collaborative learning community. Overall, aligning teaching assessment with these principles not only ensures comprehensive evaluation but also promotes the delivery of high-quality teaching practices that enhance student engagement, motivation, and academic achievement.

Suggestions

Suggestions for Implications of the Study

1. Educational institutes and teachers can take this teacher's teaching assessment form for collecting the data to improve their teaching and learning at schools. They can even take it for their teaching evaluation and analyze it in order to obtain empirical data to plan their teaching and learning.

2. The constructed teacher's teaching assessment form accordingly to Visible Learning Theory consists of 6 components, namely, Teacher-Student Relationship Component, Socratic Teaching Component, Growth Mindset Component, Inclusion Component, Parental Involvement Component, and Peer Tutoring Component. It is a 5-point rating assessment form; therefore, users need to study the form carefully in order to interpret the scores correctly.

3. After using the form and obtaining the scores, the users should check the components that have low scores and find ways to improve such.

Suggestions for Further Studies

The constructed Teacher's Teaching Assessment is an overall evaluation of teaching and learning activities. A more in-depth study on each component is needed by investigating the factors affecting the capacity of components more specifically.

Conflict of Interest

The authors declare that there is no conflict of interest.

Acknowledgement

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