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ABSTRACT

An observation instrument was developed for use in assessing the competence of preservice technology teachers in Taiwan. The observation instrument was developed by using the nominal group technique to gather input from 5 experts in technology education and 60 junior high school teachers with a background in technology education. To evaluate the reliability of the new observation instrument, the teaching of five technology teachers was videotaped and evaluated by five experienced technology teachers and a technology professor. Input regarding the new observation instrument's validity was also obtained through a questionnaire. The experts confirmed that the new observation instrument did indeed have expert validity. The instrument's reliability was determined by calculating the Kendall coefficient, which was determined to equal 0.917 and to confirm that the instrument is indeed reliable. The new observation instrument contains 39 closed- and open-ended items (evaluation criteria) in the following areas: teaching activities (explain the content of living technology, develop teaching activities, use various teaching techniques); teaching presentation (use good oral presentation techniques); classroom management (create a good learning climate, maintain good student discipline and behavior) lab management; and teaching evaluation and feedback. (Contains observation instrument.) (MN)

Observation instrument for assessing pre-service technology teachers

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ABSTRACT

A new living technology curriculum at junior high schools in Taiwan was implemented in 1997. There is no observation instruments for assessing the teaching performance of pre-service technology teachers in Taiwan. Thus, it is very important to develop an observation instrument for assessing the teaching performance of pre-service technology teachers.

The purpose of this study is to develop the observation instrument for pre-service teachers of living technology at junior high schools. This study was begun with developing instrument and its contents by the nominal group. The draft of evaluation instrument was made, tested, and then revised by researchers. Then, the draft was revised three times by panel discussion of experts and the living technology teachers thoroughly to establish the validity of the observation instrument.

Five pre-service teachers were taped to establish the reliability of the observation instrument. Then, the teaching process of tape was evaluated by five senior teachers and a professor of living technology. After that, the questionnaire was implemented to investigate the response about the usage of the observation instrument. Finally, the conclusion and suggestions were provided based on the result above.

Observation instrument for assessing pre-service technology teachers

Need

In Taiwan, according to the Teacher Education Law, a new evaluation system for teaching practice of pre-service technology teachers will be conducted in the calendar year of 1997. At the same time, a new living technology curriculum at junior high schools in Taiwan was implemented. The technology teaching is one of the important teaching event in a teacher education program. However, there is no observation instruments for assessing the teaching performance of pre-service technology teachers in Taiwan. Thus, it is very important to develop an observation instrument for assessing the teaching performance of pre-service technology teachers.

Purpose of the Study

The first purpose of this study is to develop an the observation instrument which has its validity for technology teaching. The instrument is designed to assess the competence of the pre-service teacher in technology teaching. The second purpose of this study is to apply the instrument in evaluating technology teaching to establish its reliability.

Research Framework---Method and Process

method

The methodology for the study included a literature review, nominal group technique which was described in table 1(Tsi-Li Kaung, 1995), panel discussion, instrument development, and instrument evaluation. Sixty-five(three times) experts were asked for evaluating technology teachers to set up the validity of the instrument.

In order to set up the reliability of this instrument, the videos of technology teaching from five technology teachers were recorded. An evaluation was conducted by five technology teachers and a technology professor. At last, the questionnaire was sent out to investigate the response about the usage of the observation instrument.

Table 1.

Method and Content of Nominal Group Technique

Step	Holder's work	Group work
1. hold meeting	1. welcome participators 2. describe goals & importance of the meeting 3. define the roles of members	
2. produce idea by themselves	1. propose explored problems for 15 minutes	1. think about problems by oneself 2. write down answers
3. list idea by turns	1. present ideas on blackboards until all the ideas listed	1. present one idea each time
4. clarify discussion	1. clarify all the idea to let each member understand its meaning	1. propose unclear idea

5. list idea according to priority	1. collect evaluation card for analysis	1. list idea according to priority or evaluation score

Process

The process of this research was indicated in Figure 1. The first phase of the literature analysis and related research including theory (Dei-Jang Chang, 1994), competencies (Data Working Group, 1995), and instruments (Cinquini, V., Robutti, O., & Vincenzi, A. B., 1994; Estes, G.D., Stansbury, K., & Long, C., 1990; Simpson, R. D., & Brown, D.R.,1977; South Carolina Education Improvement Task Force,1981), was explored. The second phase of competencies, and criteria was establish according to literature review and nominal group discussion. The third phase of the instrument and manual was developed by the author. A video of technology teaching was recorded. The research team which included five members reviewed and evaluated the video. The research team met for twenty five hours to discuss and edit the instrument and manual. This team includes one principal who has doctor degree, two instructors who have master degrees, one teacher in school, and myself. All the five members of the team have had teaching experience. Their efforts aided with the development of the final version of the observation instrument and manual.

Five experts at universities and sixty teachers in junior high shcools, with background in technology education, validated the instrument. This ascertained that the competencies and criteria of the instrument had expert validity.

Then, some technology teaching units were selected and the teaching of five technology teachers were recorded. Five experienced technology teachers and a professor evaluated videos of five technology teachers to set up the reliability of this instrument. As a result, the correlation coefficient was figured out.

Finally, the investigation of questionnairing was implemented to get the response about the usage of the observation instrument.

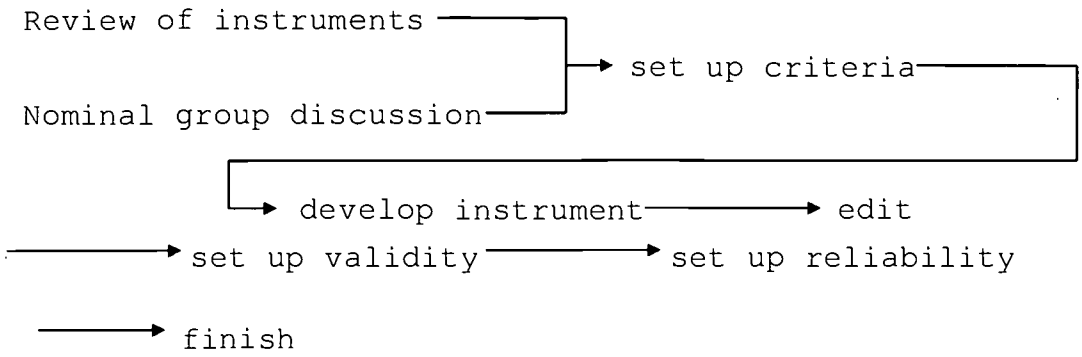

Figure 1. Research Framework

Content of the instrument and manual

This observation instrument was divided into five parts. Each part had its percentage in whole score. They are:(1) teaching activities; (2) teaching presentation; (3) classroom management; (4) lab management; (5) teaching evaluation and feedback. It includes instrument, manual and its application. The instrument includes thirty-nine items of criteria. They are as follows:

observing instrument for assessing pre-service technology teachers

Pre-service teacher:_____Evaluator:_____
Date:_____Time:_____
Description of Evaluation:

This instrument is for assessing the performance of pre-service teachers in the technology education by observing the teaching.

Criteria and Directions:

1. The item of competence to be considered "pass" depends upon the pre-service technology teacher' s performance of all the assessment items.
2. A "very good" rating is equal to 5 scores. A "good" rating is equal to 4 scores. A "medium" rating is equal to 3 scores. "Bad" is equal to 2 scores. A "very bad" rating is equal to 1 score. If the student get 3 or more than 3 scores in each item of competence, his level of competence is considered as a "pass" score.
3. If the total score of the competence items is 117 or more, then the pre-service technology teacher's performance is considered a "pass."
4. The description of the criterion is presented in the "observation instrument manual for assessing the teaching performance of pre-service technology teachers.

Evaluation result for this instrument:

Scores:_____ Pass ☐ ,Fail ☐

Signature of evaluator:

Phase A: teaching activities

Competencies & Criteria	very good, Good, Medium, Bad, very Bad 5 4 3 2 1
Competency A1: to explain the content of living technology	
Criterion A1.1: indicates the important teaching content of information and communication, construction and manufacture, and energy and transportation systems '(three technology systems)	☐ ☐ ☐ ☐ ☐
Criterion A1.2: describes the application of three technology systems on our life	

☐ ☐ ☐ ☐ ☐

Criterion A1.3: clarifies the learning difficulty and conceptual mistakes in three technology systems ☐ ☐ ☐ ☐ ☐

Competency A2: to develop teaching activities of living technology

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Criterion A2.1: motivates students to learn technology when the class is begung ☐ ☐ ☐ ☐ ☐

Criterion A2.2: makes use of examples to develop teaching activities ☐ ☐ ☐ ☐ ☐

Criterion A2.3: guides students to finish the manufacture of life-directed projects ☐ ☐ ☐ ☐ ☐

Criterion A2.4: selects appropriate resources for the project ☐ ☐ ☐ ☐ ☐

Competency A3: to use various technology teaching techniques

Criterion A3.1: uses various teaching methods dexterously ☐ ☐ ☐ ☐ ☐

Criterion A3.2: divides students into small groups for implementing technology teaching activities according to their competencies ☐ ☐ ☐ ☐ ☐

Criterion A3.3: proper selection and use of teaching media ☐ ☐ ☐ ☐ ☐

Criterion A3.4: effective use of the technology teaching time ☐ ☐ ☐ ☐ ☐

Phase A: Description:

Phase A: Scores of Teaching activities: _____

Phase B: teaching presentation

Competency B1: to present the teaching content using good oral presentation techniques

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Criterion B1.1: uses simple and clear sentences or diagrams to present the teaching content ☐ ☐ ☐ ☐ ☐

Criterion B1.2: uses clear oral presentation of the teaching content ☐ ☐ ☐ ☐ ☐

Criterion B1.3: presents the teaching content melodiously ☐ ☐ ☐ ☐ ☐

Criterion B1.4: lectures by means of appropriate volume ☐ ☐ ☐ ☐ ☐

Criterion B1.5: lectures by means of appropriate speed so students can follow ☐ ☐ ☐ ☐ ☐

Competency B2: to present the teaching content of living technology by means of body language

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Criterion B2.1: uses appropriate sign language to forward message to students ☐ ☐ ☐ ☐ ☐

Criterion B2.2: forward message to students by means of appropriate facial expression ☐ ☐ ☐ ☐ ☐

Criterion B2.3: maintains appropriate poise ☐ ☐ ☐ ☐ ☐

Phase B: Description:

Phase B: Scores of Teaching presentation: _____

Phase C: Classroom management

Competency C1: to construct good technology learning climate

Criterion C1.1: implements interactive technology teaching ☐ ☐ ☐ ☐ ☐

Criterion C1.2: supervises students' project activities diligently ☐ ☐ ☐ ☐ ☐

Competency C2: to maintain good students discipline in the classroom

Criterion C2.1: leads students to follow classroom rules ☐ ☐ ☐ ☐ ☐

Criterion C2.2: stops students who violate classroom rules on a timely basis ☐ ☐ ☐ ☐ ☐

Criterion C2.3: maintains student order in the classroom ☐ ☐ ☐ ☐ ☐

Competency C3: to lead students to have good behavior performance in the classroom

Criterion C3.1: informs students of the expected behavior performance ☐ ☐ ☐ ☐ ☐

Criterion C3.2: compliments students on good behavior performance in class ☐ ☐ ☐ ☐ ☐

Phase C: Description:

Phase C: Scores of Classroom management :_____

Phase D: lab management

Competency D1: to maintain safety and sanitary conditions in the lab

Criterion D1.1: explains the rules of safety and sanitation in the lab at the beginning of class ☐ ☐ ☐ ☐ ☐

Criterion D1.2: requests students to put on safe appliance

☐ ☐ ☐ ☐ ☐

Criterion D1.3: guides students to practice safe procedure at all time ☐ ☐ ☐ ☐ ☐

Criterion D1.4: maintains clear route for walking or working in the lab ☐ ☐ ☐ ☐ ☐

Competency D2: to use and manage equipment and tools correctly

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Criterion D2.1: operates various equipment and tools correctly ☐ ☐ ☐ ☐ ☐

Criterion D2.2: guides students to make good use of personnel organization for the management of appliance, material, tools and equipment ☐ ☐ ☐ ☐ ☐

Criterion D2.3: guides students to keep just used appliance, material, tools and equipment in order and clean them ☐ ☐ ☐ ☐ ☐

Phase D: Description:

_____

Phase D: Scores of lab management:_____

Phase E: teaching evaluation and feedback.

Competency E1: to evaluate students objectively in technology teaching

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Criterion E1.1: selects appropriate instruments according to teaching objectives ☐ ☐ ☐ ☐ ☐

Criterion E1.2: evaluates students' preliminary competencies when the class is begun ☐ ☐ ☐ ☐ ☐

Criterion E1.3: uses a variety of methodologies for evaluating the teaching performance of students according to teaching objectives ☐ ☐ ☐ ☐ ☐

Competency E2: provides students feedback on evaluation results

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Criterion E2.1: encourages students appropriately on evaluation result ☐ ☐ ☐ ☐ ☐

Criterion E2.2: guides students to self-review based on evaluation results ☐ ☐ ☐ ☐ ☐

Criterion E2.3: assign student lessons in accordance with evaluation results ☐ ☐ ☐ ☐ ☐

Other criteria(please describe):

Phase E: Description:

_____

Phase E: Scores of Teaching evaluation & feedback:_____

Evaluation result for this instrument:

Scores:

Description:

Observation Instrument manual for assessing the teaching performance of pre-service technology teachers

Phase A: teaching activities

Competency A2: to develop teaching activities of living technology

Criterion A2.2: makes use of examples to develop teaching activities

Description: The content of technology teaching activities in the classroom/lab includes information and communication, construction and manufacture, energy and transportation. Thus, teachers should make use of positive and negative examples to develop the teaching activity of the project which related to the above technological systems.

Criterion A2.3: guides students to finish the manufacture of the life-directed projects

Description: Teachers should teach students how to manufacture the project. Therefore, the process of the manufacture need to be explained very clearly by teachers.

Criterion A2.4: selects appropriate resources for the project

Description: Teachers should select and provide enough appliance, equipment, instructional materials, books, catalog of technology

product and etc. Teachers might also ask students to bring related resources such as waste materials, appliances and other learning materials. This is the way for students to improve their competencies of comprehension and application.

Description:

(Note: additional information regarding other criteria and description can be obtained from the author)

Results

Validity

The instrument had expert validity. Five technoogy experts at universities and sixty technology teachers in junior high shcools, validated the instrument for three times.

Reliability

The Kendall coefficient of concordance was equal to 0.917 for the whole phases of the instrument. This ascertained that the competencies and criteria of the instrument had reliability.

Questionnairing

The response of investigation from questionnairing about the usage of the observation instrument was good.

Application

Stage 1: Diagnosis of the Disadvantages.

Step 1: Self-diagnosis. The pre-service technology teacher may use the instrument to self-evaluate his own teaching performance.

Step 2: Supervisors' or helping teachers' evaluation. In addition to the supervisor and helping teacher evaluation, the principal and other teachers should be encouraged to evaluate the pre-service technology teacher.

Step 3: Students' assisted evaluation. The student should make an evaluation report assessing his pre-service technology teacher's teaching performance.

Step 4: Counseling meeting. A counseling meeting will be held to inform the pre-service technology teacher about the evaluaton results of supervisors, helping teachers and students. Suggestions are made to help the pre-service technology teacher to improve his teaching.

Stage 2: Preparing professional development.

In order to improve the teaching, the pre-service technology teacher should write a proposal on his own professional development under the supervision of his supervisor or helping teacher.

Stage 3: Implementing professional development. According to the proposal, the pre-service technology teacher would watch videos on teaching, participate in a seminar, and simulate the points of other teachers' teaching to improve his own performance.

Stage 4: Review conference . A conference would be held for reviewing and discussing the performance of the pre-service technology teacher after professional development. If the pre-service technology teacher lacks performance in teaching, he should be advised on how to implement a professional development program that will assist him in teaching development.

Conclusions and Recommendations

Conclusions

This study drew the following four conclusions:

1. It was determined that the following phases were required to assess the performance of the pre-service teacher in teaching of living technology at junior high schools by observing: (1)teaching activities; (2) teaching presentation; (3) classroom management; (4) lab management; (5) teaching evaluation and feedback.
2. The instrument includes the items of closed and opened questions in order to evaluate the whole performance of pre-service technology teachers.
3. The instrument is not only for formative evaluation but also summative evaluation.
4. The instrument of portfolio's evaluation is required for implementing the formative evaluation, just as buying or planning equipment, planning teaching before teaching in addition to the observation instrument of technology teaching.

Recommendations

This study recommended the following:

1. Major objectives of the instrument: Preparing professional development should be the major objectives of the instrument, instead of only evaluating.
2. Reference for evaluation: The instrument developed by this study might provide a reference for the evaluation of the pre-service teacher in living technology.
3. Making good use of the instrument's manual: Before applying

the instrument, the manual of this instrument should be thoroughly reviewed and understood in order to make good use of the instrument.

4. Further development of instruments: It is necessary for the further study to develop portfolio instrument for assessing the process of teaching practice for pre-service teachers in technology teaching.

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