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TRAINING TEACHING SKILLS IN BIOLOGY FOR STUDENTS AT PEDAGOGICAL UNIVERSITIES BY MICROTEACHING

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INTRODUCTION

1. RATIONALES

In order to pursue the aim of training and education using student capacity-based approach, tertiary Ss of Biological Teacher Training should learn teaching skills (TSs), which then can help them to effectively apply delegating methodology in teaching. However, limited class time in credit-based academic system to some extend has been negatively affected TSs practice of students (Ss). Hence, this problem requires the fundamental and comprehensive renovation of curriculums and methods for TSs training to develop self-study and self-improve capacity for Ss. Microteaching (MT) is one of efficacious TSs approach since it focuses on training each skill in a short period in a small-scale classroom. MT helps Ss practice TSs through teaching tools, also through assessment and feedback processes. Above are the rationales for doing the Project "Training TSs In Biology For Ss At Pedagogical Universities By MT", with a passion to contribute to teaching method innovation, material supplementation, and training TSs toolkit to improve the effectiveness of practicing pedagogic skills.

2. STUDY AIMS: Applying MT to organizational skills training in teaching Biology for Ss of Pedagogical Universities.

3. SCIENTIFIC HYPOTHESIS: Our hypothesis is that micro teaching can be applied to effective organizational skills training for tertiary Ss of Biology Department .

4. Subject and object of study

4.1. Study subjects: TSs, MT, training TSs by MT.

4.2. Studied object: The process of TSs training for tertiary Ss of Biology using micro teaching.

5. RESEARCH TASKS

5.1. Review literature of applied MT to train TSs in the world and in Vietnam to determine the content and structure of TSs; the content of MT and substances of MT, the ways to assess Ss' competency in TSs, the application of the micro teaching approach in TSs training for tertiary Ss of Biology Education in the context of present teacher training in Vietnam.

5.2. Conduct empirical research on matters related to the topic.

5.3. Determine fundamental steps and the order of these steps of some classroom organizational skills.

5.4. Design the training toolkits includes: activity sheets, observe-assess sheets, rubric of assessment guides, guides for practicing some TSs used to organize lessons in classes by micro teaching.

5.5. Define rules and procedures of applying MT to TSs training in Biological teaching classes.

5.6. Conduct pedagogical experiments to test the effectiveness of the application MT to some certain organizational skills training for Ss of Biological Education faculties.

6. SCOPE OF THE STUDY: The thesis focused on applying MT to some classroom organizational skills training for tertiary Ss of

Biological teaching faculties.

7. RESEARCH METHODOLOGY

The methods used in the project include theoretical studies; survey methods; professional solution; pedagogical experiment methods; processing data using Excel software.

8.THE CONTRIBUTIONS OF THE DISSERTATION

- A system of manipulation and educational expectations of some organizational TSs in Biology.

- A toolkit for training includes: activity sheets/requirements, observation-assessment sheets, the rubric of assessment guides, micro lessons.

- Rules and procedures of applying MT to TSs training in Biological teaching classes.

- Rules and procedures of establishing rubric of TSs training assessment within the scope of this project.

9. The structure of the thesis

Beside the Introduction, Conclusions and recommendations, References and Appendices, the thesis consists of three parts:

Chapter 1. Rationales and practice of the study

Chapter 2. The pedagogical skills training for tertiary Ss of Biological Education faculties by MT.

Chapter 3. Pedagogical Experiments

RESEARCH RESULTS

CHAPTER 1. RATIONALES AND PRACTICE OF THE STUDY

1.1. LITERATURE REVIEW ABOUT STUDIES ON APPLICATION MICRO TEACHING TO PEDAGOGIC SKILLS TRAINING

1.1.1. In the world

Firstly, MT first was investigated at Stanford University (United States) by Allen *et al.* (1963). Since then, a lot of research on this topic has been conducted in many countries such as projects of Cooper, Bush, Davis, Smoot, Goldwaite (1968) and so on. Results from these research showed that MT can be applied to TSs training by changing in one fluid motion and flexibility to meet the requirements of the practical situation of each country and each type of training, technical characteristics of each specific teaching.

1.1.2. In Vietnam

In Vietnam, MT is a rather new issue but has gradually attracted the attention of experts, typically the studies of Dang Van Duc, Tran Thi Thanh Thuy, Hoang Thanh Thuy, Thieu Huy Thuat, Ninh Tran Trung and Nguyen Duc Mau... Their studies have confirmed the appropriateness and efficiency of MT for the formation and development of pedagogical skills for Education Ss in Vietnam.

1.2. RATIONALES

1.2.1. Microteaching

1.2.1.1. Concept

Based on the analysis of relevant resources, we define "Microteaching" within the project scope as follows: MT is a programmed teaching approach, including a training process in which TSs are divided into several small skills, and accomplish and experience them via visual media, combined with positive feedback of the participants for the purpose of establishing and developing professional skills for Ss or Ts.

1.2.1.2. Nature of MT

- MT is a teacher training technique whereby the number of participants, training skills and time are scaled down.

- The content of training is divided into different parts, activities for skills performance are planned in a logical sequence, including supplying knowledge of pedagogical skills, observing and practicing the demonstration of TSs.

- Two components always appearing are 1- revisiting media records, 2- constructive feedback from participants.

1.2.2.3. The role of exercise in TSs by MT

MT contributes greatly to the achievement of the objectives of training process, it helps Ss practice effectively TSs, thus forming and developing professional capacity. At the same time, the results of padogagical skills learning process by MT are also a source of feedback helping researchers in science education getting the essential database for training evaluation and planning.

1.2.2.4. Advantages and disadvantages of MT

Applying MT into training process has many advantages such

as: (i) Provide constructive feedback in the modification of the behavior of Ts; (ii) Master TSs training; (iii) Actively prepare for the Ss/Ts and help TSs learning process be done according to programmed approach. However, there are some certain limitations such as it may diminish the creativity of Ss/Ts, only bring success in the controlled teaching environment and time-consuming.

1.2.2. Skills and TSs

1.2.2.1. Skills: From the literature analysis, we believe that TSs is the capacity to effectively perform a specific activity by choosing and applying appropriate methods and procedures towards the defined objectives and criteria.

1.2.2.2. Teaching skills

* *Concept:* Within the scope of this project, we used the adjusted concept of TSs from the definition of Tran Ba Hoanh and Xavier Roegiers: "TSs is the capacity to effectively perform some steps or a series of steps of a teaching activity by choosing and applying appropriate methods and procedures towards the defined objectives and criteria”

* *TSs system:* The system is divided into 3 main categories of TSs: (i) Lesson planning skills; (ii) Classroom organizational skills; (iii) Improvement assessment skills.

* *Structure of TSs:* TSs is structured from two basic components: (i) A system of actions and behavioral techniques; (ii) Logical sequence of actions.

1.2.2.3. The significance of TSs training in forming and developing

teaching capacity: There is a reciprocal relationship between skills and competencies. In order to establish and develop professional capacity for Ss, it is necessary to focus on the formation and training of TSs.

1.3. The practical basis

Results from the empirical research have suggested that although the classroom organizational skills have been practiced but have not met the Ss' need of rehearsal. The approach of practicing each separate skill first, then integrated skills in micro teaching model attracts attention of the majority of Ss.

CHAPTER 2
TRAINNING TEACHING SKILLS IN BIOLOGY FOR STUDENTS OF PEDAGOGICAL UNIVERSITIES BY MICROTEACHING

2.1. BUIDING THE TEACHING SKILLS ACTIONS

2.1.1. Practicing TSs system by MT

By analyzing literature, we recognize that in the process of applying MT, the actualization of knowledge about skills would be recorded or videoed should only fit the implementation TSs the observable actions. Hence it is only suitable for the TSs involving observable actions. Moreover, the investigation about TSs training status showed that most of the Ts and Ss suggested that classroom organizational skills should be prioritized since they were very important and strictly related to the successful teaching in Biology.

Additionally, they can help integrate some other essential TSs for Education Ss. The set of actions to practice TSs in the scope of this project is described in table 1.

Table 1. Logical actions of classroom organizational skills

No.	**TSs**	**Logical sequence of actions**
1	Check old knowled-ge	1. Inform Ss of checking old knowledge and checking methods 2. Request Ss to close textbooks and notebooks and focus 3. Raise questions or give Biological tests 4. Call Ss 5. Listen to Ss' response or observe them doing tests 6. Request other Ss to give feedback on these answers/results 7. Add more information or correct the wrong knowledge 8. Assess and mark
2	Skills of using visual tools (real specimen s, paintings, films ...)	1. Display and introduce visual tools 2. Give orientation and requirements of the lesson 3. Give instructions to student for how to observe, obtain and use knowledge from visual tools. 4. Organize the active digging visual tools for knowledge 5. The teacher synthesize and remark the key Biology knowledge 6. Return/delete/turn off visual tools after use.
3	Skills of using biologica l experime nts to	1. Introduction 2. Hypothesis 3. Display and check the preparation of needed chemicals, instruments, samples. 4. Introduce the experimental procedures 5. Conduct experiments

	teach new knowledge	6. Schedule for results reporting and explanation 7. Synthesize and remark key knowledge 8. Tidy and return instruments and samples, materials and chemicals.
4	Skills of using questions and feedback	1. Teacher supply orient information 2. Teacher raises questions 3. Give time 4. Request answers from Ss (can give additional questions if necessary) 5. Assess, add more information or correct wrong Biological knowledge
5	Skills to organize group activities	1. Introduce topics and activities 2. Group forming 3. Give instructions and set time for group working 4. Guide and observe the working process of Ss 5. Ss reveal results of discussions 6. Conduct analysis, give conclusions and what is the lesson

2.1.2. Design a toolkit to support the application of practicing TSs by MT for Ss of Biology teaching.

2.1.2.1. Activity sheets: Include the following main issues: training tasks; intellectual skills; skills assessment scales; training plans; review and evaluation.

2.1.2.2. MT plans: MT plans associated with forging one or several specific TSs in combining so many different TSs. MT plans express limitations in the amount of knowledge and teaching time.

2.1.2.3. Observation sheets: Observation sheets include open questions and a checklist. They can be used for self-assessment and peer review.

2.1.3. The process of applying MT to train TSs for Biology Ss in

Pedagogical Universities

2.1.3.1. Principles: Meet the aims of teaching Biological Education Methodology subjects; Ensure the scientific and precise characteristics of contents; Suitable to Ss; Separate each skill for practicing, observation, analysis and assessment. The process of skills practice should be done repeatedly.

2.1.3.2. The procedures

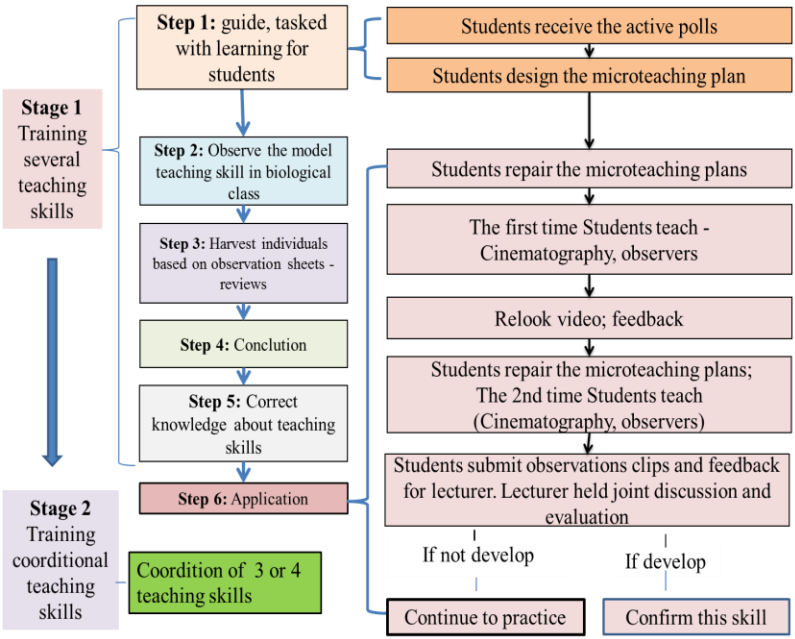

Figure 1. The procedures of practicing TSs by MT

Stage 1- Practice single teaching skill

Step 1- Give learning duties to Ss through activity sheets. After receiving the sheets, Ss start designing detailed micro lesson plans following the requests in the sheets.

Step 2- Observe the performance of TSs in Biology class time: the activities to perform the TSs are not necessarily at the highest level. In this process, Ss use observation – assessment sheets to assess skills performance.

Step 3- Personal Assessment: Ss use rubric to assess the skills performance observed, give their personal opinions.

Step 4- Discussion: The whole class participates in the discussions of TSs performance observed.

Step 5- Refine knowledge: Ts assess, extend and refine knowledge of the practiced TSs.

Step 6- Implement: Ss amend the prepared micro lesson plans and practice skills following the procedures: (Step 6A) Amend micro lesson plans; (Step 6B) Practice the first teaching: some Ss practice teaching in 5-10 minutes and are tapevideo recorded. In this process, Ts and the observers will assess the competence level of TSs performed by the Ss; (Step 6C) Ss watch the recorded video, discuss and give feedback (5-10 minutes); (Step 6D) Amend the micro lesson plan and practice the second teaching based on feedback. Ss can self-practice without Ts. Videos can be recorded using mobiles, cameras or laboratory cameras; (Step 6E) Submit the videos and assessment sheets to Ts. The Ts can watch the videos and assess using observation sheets. Schedule a discussion time to exchange information, gain lessons and propose solutions for assessments and improvements. If skills teaching performance meets requirements, Ss will determine the skills and use them for another content.

Conversely, if the performance does not meet requirements, Ss will continue amending the lesson plans and will perform the third teaching practice (return to step 6D).

Stage 2- Practice combined TSs: after some single TSs are established, Ts request Ss to comnine 3-4 skills in one activity. The skills for combination have to be of chronological orders and have the interrelationship in the performance.

2.2. THE CONSTRUCTION OF ASSESSMENT CRITERIA ON LEVELS ACHIEVED IN TSS

2.2.1. Principles: (1) Ensure the appropriateness; (2) Ensure the reliability; (3) Ensure the practicality and feasibility; (4) Make sure you have specific properties and independence; (5) Ensure the popularity

2.2.2. The procedure

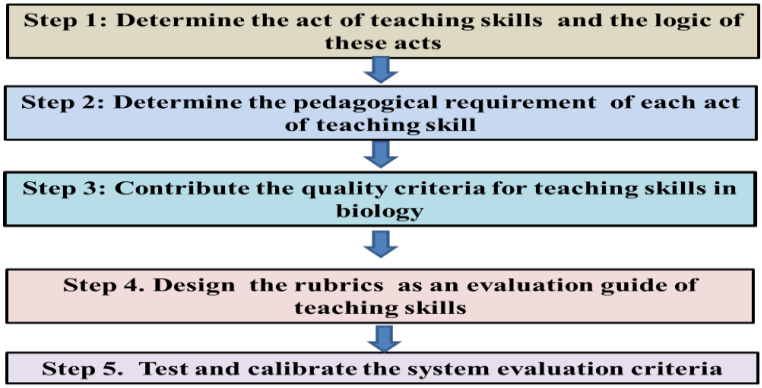

Figure 2. The procedure to establish criteria set of TSs assessment

Step 1- Determine the actions of teahing skills and the logical sequence of these actions. These actions are considered as criteria of

skills performance, is the duty of Ts in the training process. Depending on each teaching skill, the numbers of actions can be from 5-10.

Step 2- Determine teaching requirements need to be achieved in each action: The success in performing actions of TSs depends on the level of meeting teaching requirements for that action. Each action can have different levels of requirements, decided by action characteristics. The teaching requirements need to be measurable or observable because they are evidence of Ts' capacity to perform a certain teaching action.

Step 3- Establish criteria of TSs quality in Biology: The establishment of quality criteria aims to determimne the quality levels of the actions of certain TSs. The quality criteria are established in increasing levels as described in table 2.

Table 2. Description of different levels of behavior achieved in TSs

Level	Change	Behavior Description
1 - Poor expression	F – Poor (Less than 4.0 points)	No or very limited expression of right actions; not perform actions in logical sequence.
2 - Initially skilled but less effective	D - Average weak (4.0 - 5.4 points)	Implement a number of actions by following rigid guidelines; also implement actions in the wrong orders. Not meet requirements for some behavioral techniques, and perform unnecessary movements. During the implementation process, they become confused, or have attitudes and behaviors relying on other people's reminders.
3 - Not	C -	- Perform basic actions of TSs more

profession al	Average (5.5 - 6.9 points)	accurately. but still make a few small errors, miss some actions or make unnecessary movements; lack of flexibility in different circumstances, but still achieved a certain effectiveness.
4 – Precise performan ce	B - Pretty (7.0 - 8.4 points)	Demonstrate the skills needed for classes to perform well. Perform completely and timely logical implementation of skills. Ensure technical / behavioral basic pedagogical requirements, although there are a few minor mistakes, but not significantly affect.
5 - Skillful	A - Excellent (8.5 - 10 points)	Complete all tasks in a very precise order, with high speed, there is a coordination of different actions in a natural, unified and creative way. Fast response to rising problems.

Step 4- Create rubrico f guides for TSs assessments in Biology: Rubric is a detailed systematic description of desired directions that learners should follow in order to achieve the final objective of a certain task. Rubric of TSs assessment consists of the criteria for each teaching skill and is described as a set of index.

Step 5- Experiment and adjust the criteria system of assessment : There are two methods used in the thesis including expert method and emperical study in pedagogical universities.

From the above procedure, we constructed 5 rubrics to assess the competency of student in 5 TSs: old lesson checking skills, skills to use questions- feedback, skills to organize group activities, skills to use visual tools and skills to use biological experiments in teaching new knowledge. Here is an example demonstrating the rubric of

assessing visual tool using skills.

2.1.3. Result of the construction of evaluation criteria for TSs

Level	Change	Indicator Conversions
1	F – (> 4.0 points)	- Perform a very incomplete and incorrect logic of process steps using visual aids (missing 3 steps or more); visual aids merely used to illustrate the content in question; - Use visual aids not at the right time, right place, not enough intensity; - Failure to ensure behavioral specifications / pedagogical requirements such as hands showing visual aids, prevent Ss' vision, not cover all the class; volume, intonation are not suitable, visual aids performances are too fast or too slow. - Knowledge is not precise
2	D – (4.0 – 5.4 points)	Perform incomplete processing steps using visual aids (3/4/5 steps missing or lacking 2 in 3 steps 1,2,6), logical order was not guaranteed in implementation of the actions, mainly used to illustrate. - Use visual aids in the right time, at the right place, but not enough intensity or vice versa; - Also errors while technicians perform acts / pedagogical requirements such as using hands to show visual aids; prevent vision of Ss; not cover during the normal class size; volume, intonation are not suitable; visual aids performances too fast or too slow.
3	C – (5.5 – 6.9 points)	- Achieve the basic steps of the process used, but sometimes confusing sequence of steps / missing a step (but there must be steps 3, 4 , 5) - Use visual aids right time, right place, sufficient intensity; - Also errors while technicians perform some

		acts / pedagogical requirements such as hands showing visual aids; prevent Ss' vision; not cover all the class; volume, intonation is not suitable; visual aids performances are too fast or too slow.
4	B - (7.0 – 8.4 points)	- Perform full and timely logical steps of using visual aids. - Use visual aids at the right time, at the right place, sufficient intensity; - Ensure technical / behavioral requirements necessary pedagogical, erroneous or misleading at first but they do not affect the efficiency of teaching visual aids.
5	A – (8.5 – 10 points)	- Perform full, correct logic and flexible actions of visual aids processes use in teaching, ensure the supplied visual aids is mainly knowledge. - Use visual aids in right time, at right place, sufficient intensity; - Ensure all technical / behavioral requirements necessary pedagogy. - Flexibility and creativity in handling situations that arise.

2.3. Applying the procedure to design training documentation for TSs practice by MT

From the above proposed procedure, we designed 6 micro lessons used during teaching practice in biology education methodologies subjects (equivalent to 60 hours).

The general structure of the micro lesson is reflected in the microlesson number 4- Practice the skills of using visual tools.

1. Objectives ***1.1. Knowledge:*** Ss perceive necessary actions and teaching

requirements of the skills of using visual tools and the assessment methods for these skills.

1.2. Skills: Ss practice the skills of using visual tools and assess the competence in using these skills.

1.3. Attitude: Aware of the improvements in skills by practicing and be independent in the skills practice process.

2. Contents

2.1. Observe actions performance to demonstrate the skills of using visual tools of secondary Ts.

2.2. Ss observe and use the rubric to assess the competency in using visual tools of the trainee teacher.

2.3. Discuss the methods to perform actions of this skill which was observed and then gain lesson and refine knowledge of the skills using visual tools.

2.4. Implement knowledge of skills and teaching method theory into practice of skills using visual tools in teaching new Biology knowledge in secondary schools.

3. Preparation

- Extract the video about perform the skills of using visual tools in teaching the knowledge of “Virus reproduction in hosted cells” – lesson 29 – Advanced Biology Grade 10 – By Teacher Vo Thi Hai – Nguyen Tat Thanh secondary school- Cau Giay- Ha Noi.
- Activity sheets, observation sheets, rubric of guides for assessing the skills of using visual tools.

*****Activity 1.*** Discover theory of visual using skills

Using ask questions-answer method with these questions:

1. What is the procedure to apply visual using skills into new knowledge teaching?
2. What are the rules/principles in using visual tools?
3. What are teaching requirements need to be met in the skill performance?
4. Why we need to meet these requirements?

Activity 2- Discover how to observe the skills performance, how to using observation- assessment sheets, how to use rubric to assess.

Activity 3. Watch the extraction of the visual using skill performance in teaching knowledge of "Virus reproduction in hosted cells"- lesson 29- Advanced Biology Grade 10.

Activity 4. Personal achievement

- Ss use results from observations and rubric of assessment guides to make assessment.

- Ss watch the video and discuss, give feedback and propose solutions for improvements.

Activity 5. Discuss and refine knowledge about visual using skills in teaching new knowledge.

Activity 6. Apply the knowledge about these skills

Ts request Ss to amend lesson plans and practice teaching in front of the class. Observers use observation sheets to track the process and assess the competency.

Activity 7. Assessment

- Observers assess the Ss who performs the skills of using visual tools (watch videos again)

- Discuss, give opinions, gain lessons in terms of: + why that student achieved that level of competency? + What strength point that student should remain? + What is his limitation? + How can the procedure of skill performance without any effects on the success of applying visual using skills to Biology teaching?

5. Homework

5.1. Form groups, each group has its own duties on practicing visual using skills via teaching Biology knowledge in secondary schools.

5.2. Instruct Ss to self-practice using visual tools, record videos and submit in 5 days.

5.3. Remind Ss to check emails to get tasks for skills practicing using experiments after submitting results of practicing visual tools using skills.

CHAPTER 3
PEDAGOGIC PRACTICE

3.1. Experimental purposes

Pedagogical experimentation aimed to verify scientific theories of the subject by examining the feasibility and effectiveness of the application MT TSs to Ss' practice. Specifically, we assess Ss on the following issues: (1) The level of competency in mastering

each skill in classroom organizational skills (2) The competency in using the combination of TSs in classroom organizational skills.

3.2. Experimental content

Conduct empirical study on applying micro lesson to Biological education methodology teaching/Biological education methodology practice.

3.3. Choosing control class and empirical class

Experimental design is testing effects in randomly assigned emperical groups compared to the control.

3.3. Results

3.3.1. Quantitative analysis of experimental results

3.3.1.1. The experimental results for Ss forming the single TSs

The average results of 2 times in each practice TSs shown in Figure 3

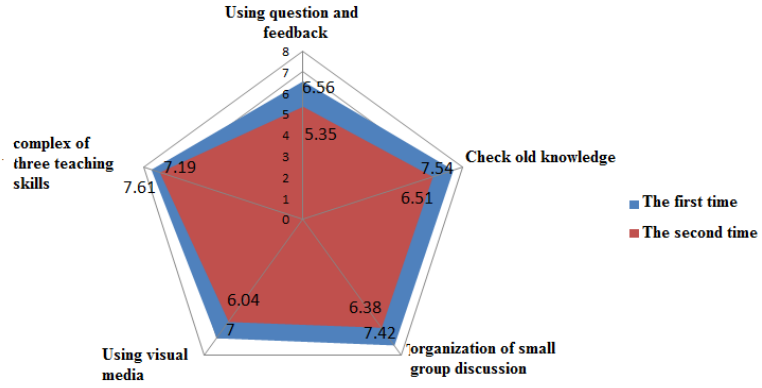

Figure 3. The average results of 2 times in each practice TSs

The results in Figure 3 shows the average score of the second train times all skills are higher compared with the first practice. In

particular, the increasing level of skills most in the ex post checks and descending to the lowest level in more time practicing coordination skills. The standard deviation and variability through the training times are in the range of knives reliably.

3.3.1.2. Comparing the results of teaching practice between the control group and the experimental group

Comparing the average value of training TSs during practice. Hypothesized Mean Difference is: "*There is no difference between the results of experimental group group and control group"* and for H1 theory: "*There is a difference between training results of experimental group group and control group*" via standard U to test the hypothesis H0 and H1 on theory, test results shown in Table 3

z - Test: Two sample for Means		
	Experimental group	**Control group**
Mean	9.46	9.21
Known Variance	0.267	0.218
Observations	130	131
Hypothesized Mean Difference:	0	
Z	4.075	
P (Z<=z) one-tail:	2.29943E-05	
z Critical one - tail:	1.644	
z counted	4.59885E-05	
Z critical	1.959	

The results of data analysis in the table shows that: Experimental group (9:46)> Control group (9:21), the absolute value of U = 4075 bigger than the standard value (with the standard Z = 1.96 significance level α = 0.05). Thus, the difference between the

control and experimental samples is statistically significant. Reject the hypothesis H0, H1 accepted for presentation: "There is a difference in training results between Experimental group and control group"

3.4.2. Qualitative analysis of experimental results

3.4.2.1. Perceptions, attitudes course of training of Ss

The results showed that 100% of the Ss in the class and the class Experimental group felt confident after the training. For the design and teaching institutions, 60.74% Experimental group class has collated with the aim to design teaching activities and skills training, this figure is the control layer 37.78%.

3.4.2.2. Regarding the development of the skills of trained Ss

Through the learning process TSs by MT, we found the skills within the research significantly increase in proficiency. However, the degree of the increase varies in each student. Experimental group group of highly skilled educated, dynamic often times increased levels between 1 and 2 times lower than with academic student

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusions

1. The innovative orientation in tertiary training and education has been aimed at building and developing their capacity. Therefore, it is extremely critical to focus on improving the classroom organizational skills such as how to use visual tools effectively, how

to apply biological experiments to acquire new knowledge, questioning and feedback techniques and team building skills, etc. Besides, prior- knowledge self assessment is also a matter of concern.

2. In student- teacher training process with the use of MT, the logical sequence of actions and teaching requirements must be prioritized. Hence, this thesis is to focus on describing those practices mentioned above in scope of study. In addition, the design for a toolkit to support the application of MT techniques including hand-outs, worksheets, MT plans, observation sheets have been seriously and scientifically implemented.

3. The process of applying MT to training TSs for Biology Ss in Pedagogical Universities have been divided into two stages:

- Stage 1- Practice individual teaching skill with 6 steps: (i) Assign learning tasks to Ss ; (ii) Observe the performance in term of using TSs in Biology class; (iii) Personal Assessment; (iv) Discussion; (v) Refine kỹ năngowledge; (vi) Implement.

- Stage 2- Practice integrated TSs: after some single TSs are established, 3 or 4 TSs are integrated and transferred into a lesson. The individual skills should be integrated and taken as a whole and applied in the real teaching situations.

4. The thesis has constructed the assessment criteria with 5 achieved levels in TSs. On that basis, we have constructed 5 rubrics to assess the competency of Ss in using 5 TSs that ensure the followings: (1) Ensure the appropriateness; (2) Ensure the reliability;

(3) Ensure the practicality and feasibility; (4) Make sure you have specific properties and independence; (5) Ensure the popularity.

5. From the above proposed procedures, we designed 6 micro lessons used as a handbook for Ss during teaching practice in biology lessons in Universities of Pedagogy.

6. MT have offered the accurate and positive feedbacks to both Ts and learners and enables Ss Ts to acquire the multiple skills and flexibly and systematically apply them to appropriate learning activities during their practice. The establishment of logical sequence of actions, the appropriate teaching requirements and Grading Rubics helps Ss have clear objectives, improve their peer- assessment and self- assessment abilities during their MT sessions.

7. The quantitative and qualitative analyses of experimental results have confirmed the feasibility and effectiveness of the thesis. It can't be denied that the application of MT in training process have been really efficient in Biology for Ss At Pedagogical Universities .

2. Recommend

2.1. Continue to expand the deployment of experimental use of laboratory skills in teaching new Biology knowledge on a larger scale.

2.2. Uniformly implement the rubric of TSs evaluation in Universities and Schools participating in training TSs for Biology Ss.

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