# INDONESIA UNIVERSITY OF EDUCATION(UPI)

## FACULITY OF SCIENCE AND MATHEMATICS EDUCATION

## DEPARTMENT OF BIOLOGY



# FINAL EXAM REPORT ON FIRST SEMESTER /BI707/BIOLOGY TEACHING AND EXPERIENCE GAINED FROM INDONESIA

*Submitted to:*

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# DEPARTMENT OF BIOLOGY EDUCATION – INDONESIA UNIVERSITY OF EDUCATION; FINAL EXAMINATION

**Course /code** : Biology Teaching; BI707 Credit: 3 credit semister hours

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## PROBLEM

Biology Education has certain characteristics. These main and specific characteristics are important for the development of Biology program in your institutions. In brief there are four curriculum models, i.e. academic subject matter, humanistic, social reconstruction and technology. Each model started from certain assumption. Curriculum models and Instructional models applied are those which suitable with the main characteristics of subject matter (Biology Education), and in turn will imply to the way it will be assessed. It is important to emphasize regarding their inter-relationship: …teachers will teach the way their students will be tested.

Based on the above texts, and our discussion sessions during the course and your results towards relevant sources, please write down your view about the following problems:

1. **Based on curriculum model (s) which is suitable to be implemented in Biology teaching in your institution, make statement the relationship to improve the quality of biology teaching with its three reasons. Please write "Vision – mission" of your own institution.**

Biology education as part of science education has its own nature, characteristics and value. The nature of biology for instance includes product, process, and application. As part of science biology education pass through different science process skills like observing, classifying, communicating, measuring, hypothesizing, calculating, estimating and infering to reach at a certain product. The results of study on biology education have major role in developing science and technology. Knowledge in biology has got through hands on and minds on activities.

As a result biology education develops thinking process and thinking pattern. The characteristics of biology education especially on the process skills are important for the development of biology program in my institution.

Curriculum models and Instructional models applied are those which suitable with the main characteristics of subject matter (Biology Education), and in turn will imply to the way it will be assessed. The ways in which curriculum decision making is organised reflects different implicit approaches on how educational systems pertain to promote innovation in education. Curriculum holds an outstanding place when seeking to promote innovation in education, as it reflects the vision for education by indicating knowledge, skills and values to be taught to students. It may express **not only *what* should be taught to students, but also *how* the students should be taught**. i.e. curriculum model should include both the academic and pedagogical knowledge in biology teaching.

The first fundamental questions for the curriculum are what knowledge, skills and values it should include and why is that so.The four types of orientations for curriculum objectives are the humanistic curriculum model, social reconstruction, technologist and academic curriculum model.

The humanistic conception focuses on personally satisfying experiences, such as the growth and personal integrity of each individual. Humanistic believed that the function of the curriculum is to provide each learner with intrinsically rewarding experience that contributes to personal libration and development. To humanists the goals of education are dynamic personal process related to the ideas of personal growth, integrity and autonomy.

The social reconstruction curriculum model puts larger social needs over individual ones. Social reconstruction curriculum tries to involve students in school and community life in order to help them to become adults who can reconstruct and improve society. The teacher is more concerned about the social problem and creating a community with students and society and is less concerned about covering the content.

The teacher in socialistic curriculum model also trusts that the greater social goal is of more value than specific content. The teacher believes that the experience of solving a problem such as creating low cost shelter for the homeless should be installed in students habits and enthusiasm for seeking out the knowledge and skills needed to take on additional problems which will involve other knowledge and skills. In this way the teacher hopes to help a student

to be not dependent upon instruction in order to function as an adult in society, but to be willing to experiment and to try new ideas and skills that can able to solve the problem of the society.

The technologist view sees curriculum as a technological process for efficiently producing ends demanded by policy makers. Technology educators have relied upon technical processes as a means of generating curriculum content. Teaching about technical processes is essential in a 'hands on' activity based education. It is clear that technology educators teach about processes. The teacher believes that by example and practice with selected processes that attitudes of safety and pride in quality will transfer to new processes.

Finally, academic orientation emphasises curriculum as a means to introduce learners to subject matter disciplines and organised fields of study. Subject matter is one of the primary organizers of the professional life. Academic subject matter knowledge prepares teachers for teaching and the subject matter assumes a central role for education. The subject matter influences actual instructional practices, as well as how teachers think about curriculum, learning, and teaching. In this curriculum model more emphasis is given for the subject matter knowledge and contents of the different fields of study.



In summary based on curriculum model (s) discussed above in my opinion those which are most suitable to be implemented in Biology teaching in my institution are the technologist and academic curriculum models. To this end then I made the following statements to show the relationship between the curriculum models and biology education to improve the quality of biology teaching followed by main reasons why it is so.

**A. Academic curriculum model**

- It prepares both teachers and students to have subject matter knowledge.
- It creates awareness on the different field of studies in biology and their interrelation ship.
- It increases confidence on a given field of study.
- Since teaching is impossible or difficult without subject matter knowledge, subject matter or academic knowledge is needed for improving the quality of biology teaching.

**B. Technological curriculum model**

- It focuses on the technical process that keeps students to learn from the process through hands-on activities.
- It is the process which is the most important in science teaching in general and biology teaching in particular.
- It develops the student's science process skills and scientific attitude.
- It makes students to create new ideas and process skills through inquiry activity and find a solution for a certain scientific problem.
- It engages students into scientific investigation and research activities.

Even though academic and technological curriculum method can be taken as the most useful in quality of education; in order to give more quality for education integrating all the four major models is better in biology teaching. Knowing the academic knowledge through a certain science process skill may not give the expected result in quality of education. In any educational system unless the education bring change or development at individual level (as humanistic model) or solve the societies or community problem at large (as social reconstruction model) the quality and sustainability of the curriculum may be unsuccessful. Therefore using these curriculum models in a more integrated manner in one institute makes quality of education in general and particularly biology education.

These curriculum model and instructional model in turn should be interlinked with the performance assessment of the student during instruction. Assessment is any act of interpreting information about student performance, collected through any of a multitude of means of evaluation like answer and question, reflection, portfolio, observation, etc.

Researchers like Warren & Nisbet (1999) have suggested that there are at least three major purposes for assessment. These include (a) improvement of teaching and learning, (b) certification of students' learning, and (c) accountability of schools and teachers. To this end assessment describes the nature of student achievement or performance. The information provided by the students assessment should have sufficient quality to be considered valid, reliable, and accurate description of student performance in the designed curriculum.

## Vision and Mission of Debire Birhan CTE

### Vision

"To see all school age children get access to quality primary education as well as producing skilled, competent and qualified human power that could play a leading role in development and building a democratic system in the society."

## Mission

"To Ensure the production of citizens who properly respect and enforce others to respect the rights and responsibilities of citizens the constitution provides, who are wary to enrich their capacity to solve problems, who would actively participate in development, in building democracy and development of science and technology.

2. **After observing opened lesson in certain schools and based on your experience in the same level of education in your country, please identify the following:**
   a. **Formulate the problem and the rationale;**

Based on my experience in the same level of education in my country; Ethiopia, and observing open lesson in three junior high schools in Indonesia I formulate the following problems in Ethiopia. This are:

The absence of interrelated contents and mode of presentation that can develop student's knowledge, cognitive abilities and behavioral change by level, to adequately enrich problem-solving ability and attitude, are some of the major problems of our education system.

A teacher-centered classroom instruction, assessment problem and teachers unable to use locally available materials to teach biology lessons due to lack of awareness affect biology teaching. In addition to these teacher's lack of interest to teach, and the subject given by unspecialized teachers also affect the effectiveness of biology education. This mainly due to lack of a system to motivate teachers and carrier structures differences between teachers and other civil sector servants.

Inadequate facilities, insufficient training on academic knowledge and pedagogical content knowledge of biology teachers, lack of updating and upgrading training, overcrowded classes, shortage of reference books, and other teaching materials, all indicate the low quality of biology education provided at school. The quality and availability of learning materials mainly due to management problem strongly affect what teachers can do.

Lack of standardized laboratory for biological studies or investigation and lack of sufficient apparatus, chemicals, models and instruments is another major constraint in delivery of lessons in biology. Even if there are nominal laboratories, many biology teachers do not use these laboratories due to lack of skills in handling the laboratory equipments and apparatus. i.e. there is a knowledge gap on the implementation of practical work designed for the level.

In addition most biology teachers at primary schools have no daily lesson plan that promote practical investigation on life science. Even those biology teachers that prepared a daily lesson plan for the content that they teach, the plan is somewhat nominal or it is prepared for managerial purpose not to improve student's learning. The prepared lesson plan didn't clearly show how to implement lesson in active ways during classroom instruction. In other way the lesson plan designed by teachers didn't promote active learning that fit with nature of biology education i.e. it lacks a hands-on and mind-on activities that relate with the student's daily life.

**b. Identify and explain all possible elements involved;**

The possible elements which are involved during my observation of an open lesson class in certain schools of Indonesia Junior High Schools and the training given at Indonesia University of Education /UPI/ are:

- **Learning community** = making each school to be a learning medium to students, teachers and the society as a whole.
- **Lesson study** = is the research lesson for improvement of student learning. Always the target during lesson study should be the "way of students learning" it should not be the way of teaching.
- **Chapter design =** is designing one chapter with its contents, period taken, way of learning, core materials, the student's objectives and competency level by including the assessment techniques.
- **Lesson design** = is designing a research lesson by choosing the way how to students learn or share their idea or learn with each other, what instrument and method should be used during instruction.
- **Open class observation** = A teacher teach a lesson while others observe the lesson. Observation is focused on student activities. Observers do not make any intervention to the student's activities.


Photo: English Open class observation at SMP 1 Lembang (left) and Physics class at SMPK 4 (right)

- **Post class discussion** = model teacher and observers come together at the end of the class, to discuss and exchange ideas regarding student's learning. From this discussion observers learn each other to apply it at their class.
- **Subject specific training** = under this training focusing on practical inquiry worksheet design, implementing the designed worksheet, method of teaching, planning, evaluation or assessment mechanisms were treated.


Photo: Training on Biology Practical course (left) and Biology Teaching course (right)

Photo: Some of the students after practical on School Science Practical course; UPI

Photo: Practical activity held during Biology practical class at STB labratory; UPI

- **On-job training** = this helps to know how a lesson is designed, implemented and improved again for making students to learn better from the lesson. This training also help to connect the theoretical concepts of biology with practical activities in lab and field activities.

Photo: Field activity during Fundamental Biology class at the Botanical garden and pond area in UPI

- **Workshops** = indicating how lesson study implement in schools, how to create learning community, how students learn from their environment by using locally available resources.
- **Cooperative teaching** = this show how teacher of primary schools work together to select and research a lesson, planning and implementing the lesson to improve student's learning. In cooperative teaching lesson plan is developed collaboratively based upon learning problems to promote student active learning through hands-on & mind-on activity, daily life, and local materials.
- **Cooperative learning** = this indicate how students help with each other and engage together and finding a solution to the problem cooperatively.
- **Problem based learning** = this is one form of active learning in science education which involve providing a certain problem for students and the students find a solution for the problem.
- **School-University Partnership for Teachers Professional Development** = under this one can understand the mutual functioned gained from the link between schools and university through lesson study.
- **Educational System of Indonesia** = this explain the general education system of the country and how lesson study was started and disseminated through the different schools.

**c. Explain operational steps to solve the problem (#a)**

In order to solve the problems listed under #a and improve science education in general and biology education in particular needs to pass through different operational steps. To this end I personally proposed the following steps. These are:

- Baseline survey on the major problems faced to implement effective science education in general and biology education in particular in primary schools.
- Inception meeting and discussion with different stake holders and arrive common consensuses with higher officials starting from the Ministry of Education to Regional Education Bureau then to Zonal and Wereda level Education Office.
- Prepare training manuals and guide lines
- Design work plan and identify model schools

- Awareness creation to school principals and supervisors.
- Training for facilitators or model teachers.
- Disseminate the training to all school teachers in the region
- Monitoring and evaluation of the training program

**d. Content coverage (content, assessment, teaching skills, science process skills) involved in the program you proposed.**

In this program the followings were the major contents covered and discussed thoroughly;

- Introduction to characteristics of Biology and Biology teaching
- Questioning, questioning techniques and Science Process Skills (SPS)
- Lesson plan & its components, Individual Study Strategy & Individual Study Plan
- Specific Instructional Objectives based on Cognitive Bloom Revision
- Concepts and content analysis in biology
- Models, Approach and Methods
- Learning Theories
- Inquiry in its many forms and roles of inquiry teaching in Biology.
- Planning, conducting, evaluating in teaching & making use of feedback
- Concept mapping,
- Role of Pedagogical Content Knowledge (PCK) in teaching Biology

In general during the course delivery the main focus given on methods of teaching biology, lesson planning, problem solving, science process skills, scientific inquiry, science process skills, questioning techniques, and planning and performance assessment are the main focus of the training up to now that all clearly solved our previous problem.

In addition at the completion of the course I tried to summarize how to relate the specific instructional objectives (SIO) of a content with active learning methods and assessment techniques, Role of Rubrics for performance assessment, learning theories, models, Approaches and Methods in teaching Science, Knowledge dimensions and the six revised Bloom's taxonomy.

On the bases of the above contents I learned the following and prepared a summarized discussion notes; all of which are use full for further training in my country. These are:-

The concepts under the new revised cognitive Bloom's taxonomy, ways of designing specific instructional objectives, how to prepare question in relation with the specific instructional objectives and Preparing and evaluating question based on the six cognitive Bloom's taxonomy. The meaning of question, use of question and questioning techniques in biology education also well treated.

Meaning and concept of science process skills and how to use the science process skills in teaching biology also treated during the course discussion. The need of lesson plan, planning techniques, and implementing plan in real biology class room were discussed. In addition to the daily lesson plan the importance of individual study strategy, mechanism of individual study plan and preparing individual study plan were practically done.

During the course of discussion on biology teaching the meaning of content and concept analysis, mechanism of content analysis and practically analyze specific biological concept based on the training. This program also helps me in order to understand the different approaches or models of teaching and how to use these models of teaching in real biology class during training of the prospective teachers in Ethiopia and primary school teachers training.

The different forms of scientific inquiry methods in relation with the difference between scientific inquiry and inquiry training models, the mechanism of using inquiry in teaching biology, and the roles of questioning in inquiry teaching were well treated.

The ways of student's learning or performance assessment by developing rubrics, what we assess during class room instruction were seen. To this end then assessment is taken as part of instruction not apart of instruction.

Role of rubrics for assessment on student's performances, building rubrics to assess student's performance, assess student's performance based on the constructed rubrics practically, and how to score and rank students performance How to assess multiple inteligence in the classroom rather than the linguistics and logic matimatics, The role of pedagogical content knowledge in teaching science ingeneral and biology in particular was discussed in detailed.

The roles and ways of preparation on Content Representation (CoRe) and Pedagogical and Proffesional exprience Reporterioes (PaP-eRs in teaching science; with particular emphasis to Biology also seen.

**e. Criteria that can be used as indicator to indicate that your programs are successful or fail. Please elaborate!**

The criteria that can be used as indicator to indicate the success or failures of the program include the followings:

- **Program orientation** = just after my arrival to Indonesia University of Education what activity must be done during my stay in the university was clearly informed with guide booklet containing a general information.
- **Course coordination and designed** = the designed courses for this program are clearly related with the problems in science education in my country. Therefore the selected courses for this training were appropriate in that they help me to solve those problems in biology education and made the program to be successful.
- **Course selection and appropriateness of the content** = the selected topics and contents under each course clearly help me to solve my problem on biology teaching first and then to give further training and implement the experience gained from this training in my country.
- **Medium of instruction** = at subject specific or on-job training courses the medium of instruction was English that create common understanding.
- **Lesson study training** = attending the training given at different junior high schools with the help of translators who translate Behasa Indonesia into English language. Under this training I clearly understand how lesson study is implement starting from the time of planning and disminated to different schools. Not only planning, implementing and discussion after class but also how lesson study become a culture and sustain in the school.
- **Workshop training =** different workshops provide basic ideas about how to create learning school community, introducing the concept of lesson study, how lesson study will implement and sustain at school.
- **Lesson study implementation/open class/** = In all open class observation the lesson presented by English and I had no problem to share experience, observe and understand what was happening in real classroom.

- **Resources availability and facilities** = resource for teaching biology books under each content were given, excellent internet access, suitable office, printer and photo copy of reference book for the training were fulfilled. Thus I can say the training was successful.
- **Monitoring and evaluation** = following how the training was going on informally every Monday and monthly formal meeting with JICA coordinator; Prof. Sumar.
- **Lecturer's commitment** = both the subject specific courses i.e biology teaching (Prof. Dr. Nuryani R.), Biology Practical (Dr. Sri Anggraeni) and on-job training (Ms. Rini and Dr. Yayan) all are committed to perform each task based on the course out line and adding additional topics for us to help and fill our knowledge gap without missing their program.

Generally the training program here was most successful to provide me with new ideas, approaches, methods and resources in teaching biology and improving the quality of primary science education in general and Biology education in particular for my country; Ethiopia.

**f. Sets of instruments that can be used to detect necessary data; please state the sources you used if you adapt the instrument from certain sources.**

Please write down at least five (5) sources used as references, at the end of your assignment. Use APA standard.



There are a number of resources books used as a reference material that can be used to detect the necessary information and data during the training program. Some of these instruments are listed below:

- A taxonomy for Learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives.
- Multiple inteligences in the class room. 3rd ed.
- Teaching science process skills: A good apple science resource book for Grade 6-8.
- Scientific method for Ecological research
- Biology: Concepts and Connections; 6th ed.
- A teacher's guide to assessment
- A history of ideas in science education: Implication for practice

- Developing portfolios for learning and assessment: Processes and principles
- Understanding and developing science teachers pedagogical content knowledge.
- Teaching tips: Methods, Approaches and Strategies
- Inquiry method of teaching
- Applied environmental biotechnology

**Other Basic instruments and sources used during the training are**:

- Cmap tool soft-ware.
- Soft copy of lecture notes including characteristics of biology and biology teaching, different learning theories, concept map, revised Bloom's taxonomy.

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