Research Based Lesson Plan: Blending The Nepalese and Japanese Approaches to Learning

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Abstract

Lesson plan has been considered as a backbone of effective teaching learning process. This research is based on a new model of lesson plan developed during the seven month training in Japan entitled "Three states of water, process of change and its daily uses/application". It is based on Nepali school level grade five-curriculum and Nepali context. In this model, Japanese and Nepali practices have been blended in teaching learning and also in teacher training programme. The ideas and learning points have been included based on national and international studies, trainings, as well as experiences of research and teaching. Valuable positive feedback from all readers and stakeholders have been incorporated. It is expected to be a resource material for teachers, students, trainers, planners and policy makers.

Keywords

Science education, Lesson plan, States of water, In-service teacher training, Research, experiment, Innovation

The Research Context

In my life, I found varieties of lesson plans from my national and international study, research, teaching, training and so on as well as their implication in Nepal. However, when I am developing a Research and experiment based lesson plan during seven month training from JICA, Japan. Then I found a new ideas and new concepts towards my previous Nepali training and teaching learning process. Development a research based lesson plan is a part of my interim report during this training. I am also disseminating and revising this research based lesson plan among the curriculum exports, students, teacher as well as my official friends, supervisors and boss. I hope this research based lesson plan may be useful for teacher and it may help to develop the interest, motivation, and positive attitude towards students, teachers, trainers and policy level personals. I also hope a positive feedback from all readers, exports and related stakeholders.

I have developed mostly confidence in this Research and experiment based model lesson plan using my internal capacity; others related personal guidelines and feedbacks. This lesson plan is based on Basic Levels' grade five Science and Environment of Nepalese school curriculum. The topic is **"Three states of water, process of change and its daily uses/application".** This lesson plan may give an overall idea of entire unit plan and specific lesson plan, Japanese model teaching, learning and training process, product as well as a new model including constructivist, connectives and contextual research based lesson plan.

Different Practices of Lesson Plans

The education is a backbone in the context of overall development of any country. The planning and its application is also a major role. For this, in the teaching learning process, the lesson plan is a major key to open the way of nation. A Teacher without lesson plan is like a cook without recipe and materials in the kitchen. A good teacher has a good lesson plan, its proper implication and feedback system from all stakeholders, exports and policy level personals. To achieve the national educational vision, mission, goal and student competencies required by curriculum, the lesson plan plays a vital role in teaching learning process. Most of the developed country as well as developing countries have the system of developing research based model lesson plan in terms of their context. There are different models of lesson plan in international, national and local level practices.

A Model of research based lesson plan

1. **NAME :** Mr. Shalik Ram Bhusal
2. **OCCUPATION:** Deputy Director, Ministry of Education, National Centre for Education Development (NCED), Sanothimi, Bhaktapur, Nepal
3. **UNIT NAME :** Matter and Energy
4. **GRADE :** 5th grade 10year students
5. **UNITE GOAL (For the entire Unit) :**

   Level wise Objective (no. 4) : Adopt simple scientific methods and process to obtained knowledge and application about matter and energy.

   Grade 5 Unit Objective: Understand and change the matter in three states using freezing, melting, sublimation, evaporation, cooling etc. as well as their uses in daily life.
6. **UNIT PLAN: (Flowing the entire Unit):**
   a. First Lesson : Three states of matter (Solid, liquid and Gas)
   b. Second Lesson: Changing the three state of a matter
   c. Third lesson : Process of changing state of mater : Freezing, Melting, Sublimating, Evaporating, Cooling
   d. Fourth Lesson: Three states of water, its process of change and their practical uses in daily life
   e. Fifth Lesson: Source of energy (Renewable and nonrenewable)
   f. Sixth Lesson: Various sources of energy (Heat, Light, electricity, sound, magnate)
   g. Seventh Lesson: Use of energy
   h. Eighth Lesson: Sun as the main source of energy
   i. Ninth Lesson: Energy crisis and methods of its conservation
7. **LESSON GOAL/ OBJECTIVES (Lesson 4):** (D) three states of water, process of change and its application.

   After The completion of this lesson the students will able :
   a. To develop an interest in the relationship between ICE, WATER and VAPOR and its process. (Interest, Motivation and attitude).
   b. To infer that the matter WATER changes its three states according to freezing in ICE (Solid), heating into water (Liquid), cooling into Vapor (Gas).
   c. to explain that water has its three states and can change by freezing, heating and cooling (Knowledge and understanding) as well as the practical use in daily file. (Using example, scientific thinking and experiments)

In Nepalese education, system varieties of educational models including lesson plan are developed for improving and achieving student achievements (CDC, 20012). Also teacher, trainers, researchers of school, collage and teacher training and research institution/ centers are developing and practicing their own models of lesson plans. As Pandit (2001) mentions general lesson plan style includes 1. General information, 2. Specific objectives, 3. Instructional materials, 4. Teaching learning activities: including student and teacher role, materials and methodology 5. evaluation and 6. Home work.

According to Rao & Laxmi (2004), the lesson plan may include previous knowledge, and in presentation including matter, method and summary in addition. But SMEMDP (1998) has mentioned overview, skill both (procedure and thinking skills), and advance preparation beside the requirement of general lesson plan.

In practice, mostly teacher facilitates the student's class without written lesson plan. Most of the teachers have mental lesson plan and short guideline notes. Few recourse centres have succeeded stories of developing teacher diary including lesson plan, its proper use and implementation. Most of the teacher and trainer are not developing and implementing the plan, experience based lesson plan published in national and international level. It has been needed to develop, facilitate and use the learning from national and international level training and experiences by all teachers, trainers, researchers as well as planners and policy makers. There are some gaps on developing and implementation between research, practice and dissemination based lesson plan and existing situation. The variety of researches have a common conclusion that our teaching learning planning and process is not fulfilling and developing the interest, motivation, positive attitude, knowledge, skill and performance as well as competencies of students and teachers prescribed by national student's and teacher's training curriculums (NCED, 2011).

In Japan, each teacher develops a research based lesson plan during training period based on particular teaching learning process. At first, it is revised by implementing it in teaching learning process with students and school staffs. After developing this lesson plan, they come in training centre and revise their lesson plan using the feedback from trainers and trainees. The lesson plan is further piloted in teaching learning process in actual class again.

After finalization, the teacher sends the lesson plan to the training centers. Experts evaluate and finalize including developer. Finally, the lesson plan appears in the form of a good research based model. It is then disseminated and published in websites, journals and different media. It is then implemented by all teachers, trainers and researchers. Every lesson plan includes interest, motivation and positive attitude.

In Japan, there are varieties of lesion plans in practice. Mostly they develop and practice research based lesson plan through the teachers, trainers and researchers. The most common model includes in the form of components/format/characteristics as:

1. general Information,
2. Unit goal,
3. Sequence of the lesson,
4. Lesson goal and objectives,
5. Lesson schedule: including training and learning process, learning contexts, teacher instruction, student activities and notes
6. Experiment developed and
7. Evaluation detail.

Using Japanese, Nepalese, other international models and my leanings as well as experiences I developed a new BHUSAL model of research based lesson plan. The major parts and characteristics of this model include:

a. The lesson plan developed during own teaching, training and research period,
b. It develops the student's interest, motivation and positive attitude toward entire lesson,
c. It is contextual in particular student class/level/grade on their local context,
d. It covers the overall planning of entire unit,

e. It is based on research in real class, websites, journals, export groups and so on,

f. There is chance of improvement and flexible according to the local/national context of the school and training centers,

g. Based on unit plan, the lesson plan includes the components/points/format as: Name of the teacher/trainer, Occupation, Unit name, Grade and age, Unit goal, Level wise objective, Grade wise Unit Objective, Lesson Goal/ Objectives

h. It includes lesson schedule with learning contents, process of learning, facilitators' activities and guidelines, student activities, materials required and remarks/ notes.

MODEL LESSON SCHDULE

SN	Process of Learning	Learning Contents	Teacher's Instructions	Student Activities	Remarks
1	**Introduction** **(5 to 10 minutes)**	1. Review of the previous lesson 2. connection ICE braking activity to the topics	1. Review questioning, debriefing . 2. Conducting Linking activities	1. Students' concentration. 2. involving in activities and discussion	
2	**Development** **(20 to 35 minutes)**	Developing students' understanding through experiments	1. Demonstrate the experiment with demo-presentation. 2. supervise and facilitate	Concentration to the teacher guidance and work in individual and group	
3	**Evaluation** **(During the activating an lastly 5 to 10 minutes)**	Student will sure achieving the lesson objectives	1. Evaluate during demonstration, individual and group work. 2. Analyze the students' achievement, provides feedback and conducts remedial teaching learning activities.	concentration to objective of the lesson and participation in evaluation process, feedback and remedial activities	

i. It includes feedbacks from the implementation of lesson plans

j. It also considers lesson Evaluation Details: including the Evaluation Process, Evaluation Technique,

k. Evaluation Tools/sheets, Lesson Evaluation using class work and home work etc.

l. Entire Lesson leanings and evaluation by developer, student and feedback provider

Lesson Evaluation Details

The entire process is evaluated based on the criteria of **c**ontinuous evaluation during the experiment using evaluation sheet, observing the participation in pair or group and further observation is carried out during experiment. The evaluation is also conducted through class work and homework. The following questions were used to evaluate the learning:

1. Did students develop an interest, motivation and positive attitude towards in the relationship between facts:

(a) Molting and heating as well as its effect

(b) Heating and vaporizing as well as its effect

(c) Cooling and freezing as well as its effect

2. Did the student felt the ICE, Water and Vapor characteristics using sense organ?

3. Did student have given a number of examples of three states of water in daily life and conducted the practical experiments correctly?

4. Did the students have given a number of examples of uses of three state of water in daily life and conducted the practical experiments correctly?

Lesson evaluation was conducted in class asking the following questions

1. How many States of water? What are they?
2. Water Converts into ice in …..^{0}C?
3. Ice Converts into water in …..^{0}C?
4. Water boils in ……..^{0}C?
5. Water converts into vapor in …..^{0}C.
6. Write the 1/1 uses of three states of water?

Experiment worksheet (Individual/Group)

1. Name of the student: ……, 2. Class and Section:..., 3. Roll No.:...,
4. Subject: Science, 5. Unit: Matter and Energy, 6. Lesson: stages of water and its application

Experiment No. and details	Prediction	Feeling	Major findings	Conclusion	Remarks
1.(a) Touching a piece of ice: 5 sec (b) Putting a piece of ice in Hand: 30 to 1 m (c) when rolling the ice: 1 m (b) Eating a piece of ice: 1 m Now, can you return my a piece of ice					
2. Lab experiment(a, b & C) (a) Melting the water (b) Boiling the water (c) Cooling the water					Melting all ice in … ^{0}C Boiling the water in ….^{0}C Cooling the water in ….. ^{0}C
Magic 3.Use of three state of water (A) Ice (B) Water (C) Vapor (a) Ice candy experiment: how? (b) Ice treatment for and heating: How? (c) Water vapor experiment: How?					Magic water = …..^{0}C But still boiling why? Candy water = …..^{0}C Candy = …..^{0}C

Similarly, homework was to make ice candy in home as well as writing the process of the experiments and experience so that it can be explained in next class. The common entire lesson evaluation in every class is given below:

Entire Lesson Evaluation For Motivation and Further Improvement (common facts)

1. Things you Enjoyed Today:	2. Things that you had known (before this Lesson/class):	3. Things you Learned today:	4. Things you Still Have a Question About??????:	5. Things your suggestion for my improvement/further interesting class:	6. Have you any things to say:
1.	1.	1.			
2.	2.	2.			
3.	3.	3.			

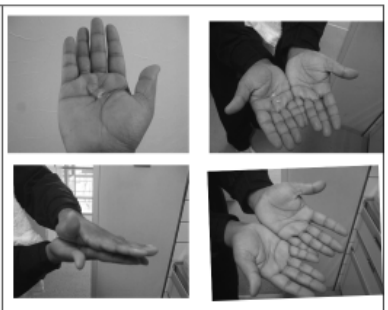
Experiment Developed

(a) Required Materials

The materials required for the experiment were ice, Beaker, Lamp or heater, Iron, Lighter, Heater, Glass and glasses cover, Kettle, A set of experiment in laboratory, Cotton, a piece of clothes flatten, Weighing machine, Thermometer, and Vicks paper. Laboratory equipment and materials were needed like ice cream making equipment and materials with ice, water, milk, sugar, ice making key, and small plastic bag.

Experiment 1: Ice Breaking Experiment Using Hand: it makes the interest, motivation and positive attitude toward the further experiments and knowledge.

1. Take a pack of many pieces of ice/ plastic packet individually/ group wise with sugar different color.
2. Take a piece of ice. Touch and eat the ice and write yours feeling about stage, hardness, cold-hot etc. in your sheet.
3. Take another peace from pocket. Give heat rolling your hand what happens. Again roll fast-fast and observe and fill in your sheet.
4. Put two or three droops of that heated water in your hand. Give hit by rolling your hands so fast for 1 minute. Then what happen write your experiment and feeling in your sheet.
5. Ask the students where you lost my ice, two droops of water? Can you please return me? And say to write their felling and experiment conclusion in sheet.



Experiment 2: An experiment of vapor into water using plastics: Individual/ group

1. Put some vapor from boiling water in plastic packet and cool using water and ice.
2. Write your findings and conclusion.

Plastic bag without air

1.A platic expanded by the pressure of the water vaper
2. Heating the water and puting the vapour in plastic bag

Cooling the plastic bag vapor using ice water table

After cooling some water in the plastic bag

Experiment 3: Experiment using balloon

1. Put the balloon in the pan 2. Heat the water by gas fire 3. Make cold using water and ice. 4. write your findings and conclusion in sheet	 A balloon without air/ vapor	 A balloon with out Vapor	 A balloon expanding the case of water vapor

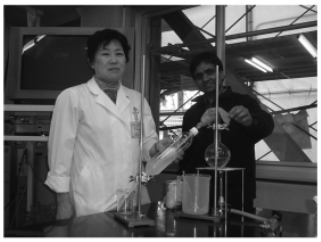
Experiment 4: An Experiment with pan and Plate Cork

1. Put half of the water in a small pot/ Pan. Then heat it using gas fire. Put water or ice in a plate and cover the pot as a cork. 2. After 5-10 minutes, take out the plate out slowly. What you see? 3. Write your findings and conclusion.		

Experiment 5: Changing water into ice by freezing

1. First of all put 3 part of ice/ snow in a pot and measure the temperature and put 1 part of salt 2. mix to the ice and measure the temperature		

Experiment 6: Experiment of states of water: Individual/group Experiment

1. Take ice/snow in a jug/pot and measure the temperature of ice. 2. Put some ICE in a round button flake. 3. Give it heat. Say to put the thermometer in to the biker. Then say to observe. 4. Write findings and conclusion in sheet. Q1. When temperature goes 100 ^{0} C and more what will happen? Q2. What do you see in first beaker at the top? Q3. Why is there water dropping from the other beaker?	   **Stage: 1a** **Stage: 1b** **Stage: 2**   **Experiment practices with facilitator in Children Hall Hokkaido JICA Training**

Experiment 7: Use of three stages of water

Writing the 3 /3 uses of water in daily/ practical life and sharing by WATA (Walk Around Talk Around) method(a strategy of critical thinking). Try to make 3 x 3 = 9 points. How many new points you got? Share with friends.

Use of ice, water and vapor in our Daily Life

Ice is used for fire/ heated treatment, Freezing, Storing the foods, medicines, vaccines etc, and for making ice cream, ice candy. The water is used for drinking, food making, farm, and for producing electricity etc. Similarly, **Vapor is used in our daily life for c**old and cough treatment, suffering from rain water, skin treatment, and for treating dry mouth etc.

Experiment 8: Use of Vapor: Individual/group Experiment

Step 1: Take half of the boiled water in flat pot and put some VICKS liquid in to the water Step 2: Take a towel and cover your head Step 3: Put your mouth up to the water and covered by the table. Step 4: Use the towel to make your mouth dry. Now you are fresh			

Experiment 9: ICE treatment on burnt body/parts

Use ice and water when your body part is burnt. It makes cold as soon as possible.

Experiment 10: Warm water with salt treatment for swelling of the body parts

If we have lags, hand or any part of body is tired off then we have/can use warm water and salt.

Experiment 11: Making Ice candy					
1.Making ice candy (a) with fruit juice	 Fig a1 Make the mixture of snow/ ice and salt 3:1 to make ice - 20^0C.	 Fig a2 put the Juice in ice key	 Fig a3 Put the ice key in the -20 degree centigrade ice.	 Fig a4 Take out the ice candy from the ice.	 Fig a5 Eat the ice in group.

(b) with mixture and different colors	 Fig b1 Make the mixture of water of different 3 colors. Using the salt water 10%, 20% and 30% in different 3 color	 Fig b2 Make the mixture of water of different 3 colors. Using the salt water 10%, 20% and 30% in different 3 color

Experiment 12: Making Ice cream

Fig 2.1
Milk 20 ml, fresh cream 10 ml and sugar 3gm

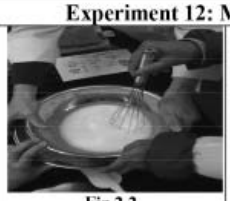


Fig 2.2
Freezing the ice cream with salt and ice mixture ice -200C temperature

Fig 2.3
Freezing the ice cream till it does not go near to solid.

Fig 2.4
Freezing the ice cream till it does not go near to solid

Results and Lessons Learned

The ice can be made cooler up to -20^{0}C using 1:3 ratio of salt and ice. I learned this fact with a ICEMAN in Nepal and used in Nepal and Japan. My daughter loves ICE cream. So, I tried to make it in my house. A ICEMAN taught me the indigenous technique to make ICE CREAM and ICE Candy. If we have no freeze in our school and house, we can conduct the experiments of co0lling the water in ICE form with out using freeze and chemical. It needs only salt and pieces of ICEs.

The ice can even be made cooler up to -72^{0}C using 1:3 ratio of methanol or ethanol and ice. The experiment showed the difference between steam and vapor. Ice cream and Ice candy can be made using salt and ice rather than using defreeze. Uses of three states of water in local, ethnic and indigenous practice have been found in different country as unique practice. Building a lesson plan is a research based experimental way of learning for further learning. So, the lesson plan should be developed research and experience based and share to stakeholders, revise it and finalize it.

Conclusion

Finally, it can be concluded that the development of a research based lesson plan creates interest, motivation and positive attitude on students, teachers, trainers, researchers as well as educational planners. In the process of developing this research-experiment based lesson plan, I found new knowledge, skill and performance as well as positive attitude towards improvement of the Nepalese education system. If the related stakeholders including teachers, trainers, researchers, and planners work and develop such kinds of research based lesson plan and find out their own model, then they may really develop their learning capacity. It may help to develop the student capacity to achieve the student learning competencies.

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