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Instructional design in teaching basic electrical engineering using Robert Gagne's model

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Abstract

Robert Gagne's model of instructional design is based on the information processing model of the mental events that occur when learners are presented with various stimuli and focuses on the learning outcomes and how to arrange specific instructional events to achieve those outcomes.Applying Gagne's nine step model is an excellent way to ensure an effective and systematic learning progress as it gives structure to the lesson plans and a holistic view to the teaching .In this paper the author have chosen verification of laws in basic electrical engineering subject both theoretically and practically in the class room environment.Apparatus required for the practical verification of the laws were provided .The author has chosen an observer to give his constructive feedback of his lesson .

Keywords: Robert Gagne's model, verification of laws, Instructional design, Teaching.

1. Introduction

Instructional events refer to actions of both teacher and learners during the teaching session.Selecting appropriate events and planning them in the right format and right sequence is crucial in a successful lesson design.A lesson design is a plan showing the type instructional events,their order and the kind of activity taking place in each event.In designing a lesson plan there are two important factors .The objectives and the learners.In this paper the author has chosen verification of laws in basic electrical engineering subject both theoretically and practically.

2. Robert Gagne's model of instructional design

Robert Gagne is consdiered to be one of the foremost contributors to the systematic approach to instructional design and his valuable ideas for trainers and teachers.Gagne's model of instructional design is based on the information processing model of the mental events that occur when adults are presented with various stimuli and focuses on the learning outcomes and how to arrange specific instructional events to achieve those outcomes.Gagne's theories have been applied to the design of instruction in several domains such as the military flying leadership,engineering and healthcare etc.

Essential to Gagnes ideas of instruction are what he calls "conditions of learning" internal conditions deal with what the learner knows prior to the instruction, external conditions deal with the stimuli that are presented to the learner.e.g Instructions provided by the teacher.The author gave the instructions to the learner about the verification of laws in the basic electrical engineering subject and also informed about the practical verfication of laws in the class in the next class.

The first step in Gagne's theory is specifying the kind of outcomes to be achieved.He categorised these outcomes in to five type's verbal information, intellectual skills, cognitive strategies, attitudes and psychomotor skills.

The second step is to organise appropriate instructional events.Gagne's events of instruction consist of the following

1. Gainning attention
2. Informing the learner of the objective
3. Stimulating recall of prerquisite learning
4. Presenting the stimulus material
5. Providing learning guigance
6. Eliciting the performance
7. Providing feedback
8. Assessing the performance
9. Enhancing retention and transfers

The following instructional events can be organised for a lesson to teach verification of laws in basic electrical engineering subject such as ohms law,Kirchoffs current law.Kirchoffs voltage law etc in a group work in the class.

I. Gaining attention

When the students arrive at class their attention can be directed toward many other things so in order for any learning to take place, first their attention must be captured and their interest should be aroused.

While entering into the class

- The author said loudly "Good morning all of you".
- The author asked questions to the learners Can you state ohms law?, what the Kirchoffs voltage laws says?,Could you describe the Kirchoffs current law?.

II. Informing the learner of the objectives.

Upon completing this session you will be able to understand and be able to verify the laws practically .

- Ohms law
- Kirchoffs voltage law
- Kirchoff's current law

III. Stimulating recall of prequisite learning

Asking questionas like how the voltmeter and ammeter in a circuit should be connected?

The learners replied that voltmeter should always be connected parallel to the circuit and ammeter always be connected series to the circuit.Then the teacher (author)asked the learner what will happen if we interchange the voltmeter by ammeter and vice versa?Leanrers replied that the ammeter coil will be damaged because the ammeter coil will have least resistance .The current will always choose the least resistance path to flow.The learners understood they should not connect ammeter parallel to the circuit and voltmeter in series to the circuit very clearly.

IV. Presenting the stimulus material

Now the entire learners were divided into five groups.Each group is given separate problem on verfication of laws.They were asked to solve the problem theoretically first then go for practical verfication of the same.

Group 1: Find the current supplied by the battery for the given circuit shown in fig.1. Verify practically.

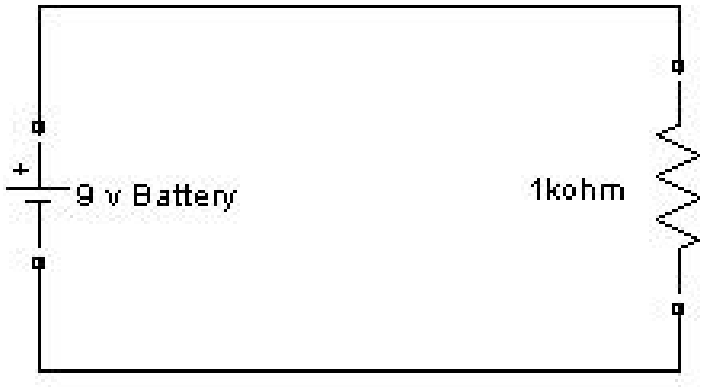

Fig.1.Circuit diagram.

Group2: Find the current supplied by the batteryshown in fig.2? Verify practically.

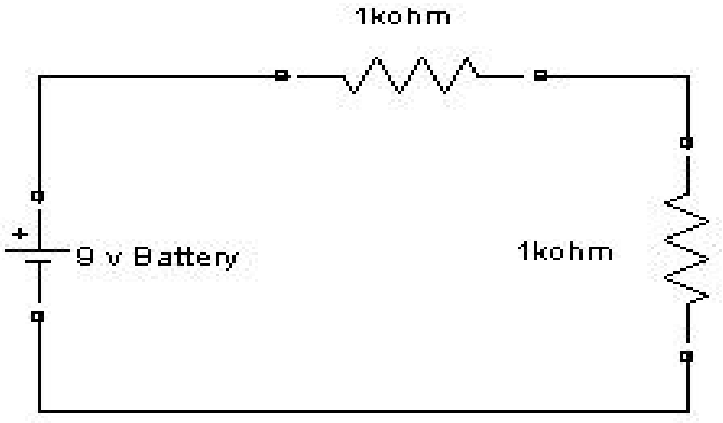

Fig.2.Circuit diagram

Group3: Verify the KVL for the given circuit shown in fig.3.

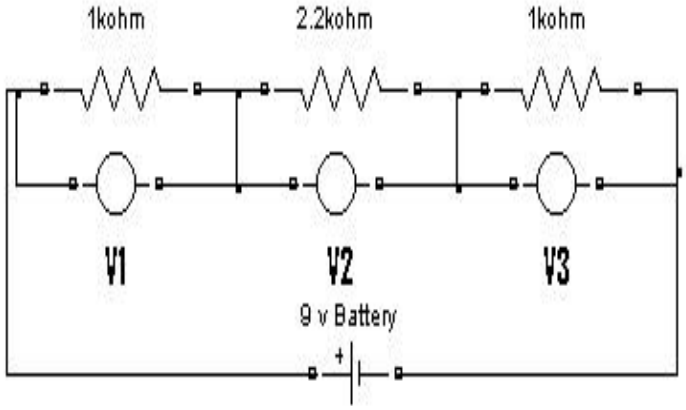

Fig.3.Circuit diagram

Group4: Verify the KCL for the given circuit as shown in the fig.4.

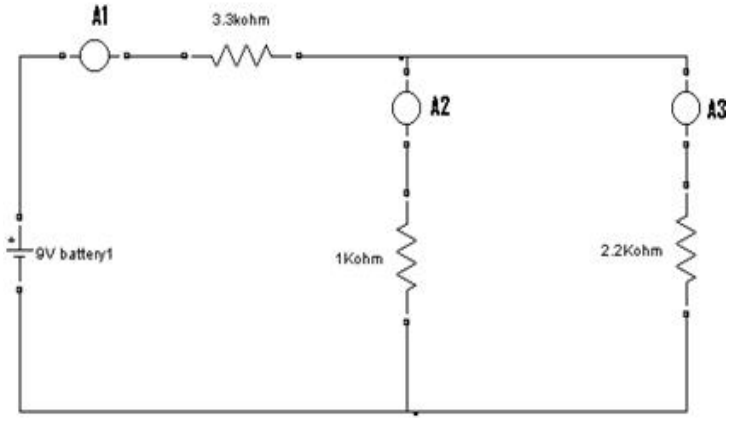

Fig.4.Circuit diagram

Group 5:Find the voltage across each resistors in the given circuit shown in fig.5.

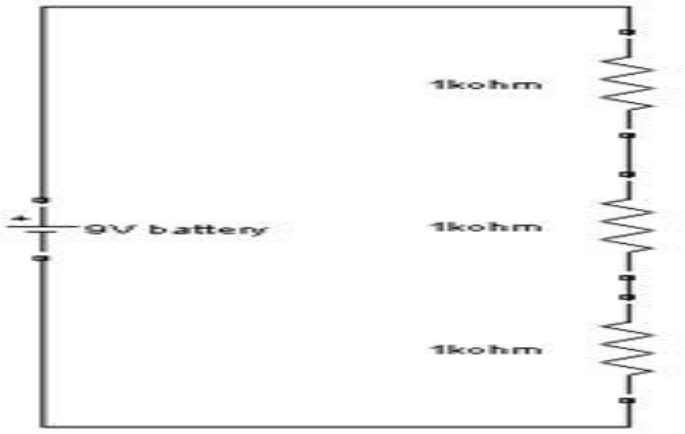

Fig.5.Circuit diagram

In the session different steps of procedure to verify laws practically are explained.

V. Providing learning guidance

The teacher has provided all the apparatus required for each group and the theory was already taught in the previous lesson and now the learners need to verify the laws practically.The teahcer inspected each group performances .The teacher guided the individual group about the connection in the bread board selection of ranges in the mutimeter.In some groups the teacher has found theretical values does not match with the practical values checked their calculations and corrected their mistakes.In some groups their connections were wrong and it was corrected.The remaining groups were done it correctly.

VI. Eliciting the performance

Now the teacher asked to exchange their task with the nearby groups.From the previous task the learners learnt a lot.Almost all the groups were performed much better in their second task compared to their first task.

Eliciting performance provided an opportunity for learners to confirm their correct understanding and the repetition further increases the likelihood of retention.

In our session each one of the learners got familiar with the equipment and performed the procedure and verified the laws under my direct supervision.

VII. Providing feedback

While observing each learner performing the procedure individual immediate feedback and guidance were provided and any questions were answered.

VIII. Assessing the performance

While assessing their performances the learners were suervised and assisted .After their first task they were able to perform independently in the second task.The teacher already prepared answers for all the questions.In the second task the learners demonstrated what they have learnt with out receiving additional hints.One session was a very short duration so the author has prepared the answers already .The answer key was very helpful in verfying the learners theoretical answers quickly.

IX **Enhancing retention and transfer**

To enhance the retention the learners were practiced more in the laboratory during their free hours.The session closed by reviewing the key points answering the questions and asking for learners feedback.

3. Conclusion

After implementing Robert Gagne's instructional model learners were felt there is a change in my methodoloy of teaching, able to understand the concept easily also shown keen interest in learning .The class room was so lively, all the learners were actively involved.Learners felt a new way of approach. Gagne's theory provided a

great deal of valuable information to the teacher .Applying Gagne's nine step model is an exclellent way to ensure an effective and systematic learning as it gives structure to the lesson plans and a holistic view to the teaching .The teacher is very much pleased with the positive and constructive feedback given by both the supervisor and learners at the end of the session.Our intention is most often to help them to understand and by putting more structure in to the objectives of the lesson plans .The author was able to achieve this aim.As Gagne himself say's "organisation is the hallmark of effective instructional material".

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