ISTE Workshop
Pedagogy for Effective Use of ICT in Engineering Education

IIT Bombay
January 2015
Action Research in Educational Technology
Educational Technology (ET) aspects

• Technology For Education
  o Creation and use of technologies, such as visualizations, and technology tools, such as Wiki and Moodle, in the teaching-learning process.

• Technology Of Education
  o Creation and use of strategies, such as Peer-Instruction and Think-Pair-Share, for facilitating students' learning and engagement.
In this Workshop, you have worked on

• Technology For Education
  o Fluent, Create-level: Visualization, Concept-Map, Wiki, screencasting
  o Familiar, Apply-level: Moodle, A-view, OER (Open Educational Resources)
  o Exposure, Understand level: tools for blogging, surveying, commenting, tagging, posting, … (recall Digital Learning Tools session)

• Technology Of Education
  o As a learner: Peer Instruction, TPS, Debate, Brainstorm race, Collaborative strategies, Chunking, Flipped classroom, Rubrics for assessment
  o As a teacher: Peer Instruction, TPS, Group Projects, Flipped classroom, Rubrics, Writing higher-order Assessment questions
In this Workshop, you have worked on

• Integrated use of ET tools and strategies
  o Active-learning strategies with visualizations
  o Collaborative strategies with Wiki
  o Concept maps with concept mapping tools
  o Group Projects with various tools
  o Flipped classroom – spoken tutorial + f2f activities
  o …
Activity - A-View Poll (2 minutes)

**Question:** Having written lesson plans to integrate use of ET in your topic, what is the next logical step?

1. Execute the lesson plan, knowing that your idea will work;
2. Execute the lesson plan and find out whether your idea is ‘working’, and to what extent;
3. Do a scientific evaluation of your idea.

**Participants:** Vote on the question above.

**Coordinators:** Convey your RC’s majority vote as your response for A-view poll shown.
What is Research in ET?

We are **ET Practitioners** when we:
• teach students; facilitate their learning.
• think about improving students' learning, interest in the subject, engagement in class, ... 
• come up with ideas for doing the above.

We become **ET Researchers** when we:
• scientifically investigate the worth of our ideas.
• conduct systematic studies to get data about whether our ideas are working.
• provide evidence to support our conclusions.
This Session is about

Going from being an ET Practitioner

towards

becoming an ET Researcher
Why should you bother with ET research?

• You are anyway working on the "problems" arising in your class; You are coming up with solutions
  o Why not go the extra steps required for closure!

• Some benefits of closure - doing a systematic study using ET research methods, followed by writing a paper - are:
  o You get a publication to your name.
  o Others could adopt your solutions.
  o Your skill in applying the scientific method in other areas of research will also improve.
Learning objectives of this session

At the end of this session, you will be able to:

- Evaluate what constitutes a valid ET research study
- Write some Research Questions for your lesson plan idea.
- State the commonly used metrics for evaluation of studies on Technology Enabled Learning.
- Identify the type of instruments required to evaluate your idea.

Lab:

- Identify the key components in an ET research paper.
- Find papers on topics similar to your lesson plan ideas.
What is an ET research study?
Is this an acceptable ET research study?

Read the next few examples and answer if the idea in each example is acceptable as an Educational Technology research paper.
Activity – Peer Instruction (2 minutes)

Your colleague says: “I have used coloured chalk pieces or coloured markers for black board and white board respectively, for better teaching, especially for waveforms and curves. PPT presentation and black board or white board should be equally utilized for an effective lecture delivery. Usage of such methods will make the lecture clear to students.”

Is this an acceptable ET research study?

1. Yes.

2. No.

Participants: Vote on the question above.

Coordinators: Convey your RC’s majority vote.
Compilation of obvious or known solutions is NOT a research paper even though the idea may have value as an effective teaching strategy.

You may have tried effective solutions to improve teaching, but not all can be converted to a research study, especially if the solution is not novel.
Your colleague says: “I will prepare interactive multimedia content. Using Moodle, the student can access the content in order to make interactive session. The student will be more interested and interactive. Interactive content will help students understand the concept more easily.”

Is this an acceptable ET research study?

1. Yes.
2. No.

Participants: Vote on the question above.

Coordinators: Convey your RC’s majority vote.
Mere development of instructional material or strategy is NOT a ET research paper even if the material is based on an innovative idea.

To be considered as a research paper, you need to show that the material or strategy has resulted in improvement in student learning or engagement.
Your colleague says: “The purpose of this study is to use Moodle, in an engg course and study the motivation behind its use by participants. Activities such as presenting information, managing course material, and evaluating student work through Moodle quizzes, all were done using Moodle. Instructors were asked the benefits and barriers to using Moodle.”

Is this an ET research study?
1. Yes.
2. No.

Participants: Vote on the question above. Coordinators: Convey your RC’s majority vote.
Use of an ET tool in a routine manner is NOT a research paper.

To be considered as an acceptable research paper, you need to implement an innovative method of using the tool to achieve a teaching-learning goal.

Example: Use Moodle to create a game that allows student to learn a concept; teacher can check how much collaboration occurs.
Your colleague says: “I used Peer Instruction in my class. I posed questions, students debated enthusiastically. I saw that they were engaged. I also think that they learnt since they gave correct answers.”

Is this an ET research study?
1. Yes.
2. No.

Participants: Vote on the question above.
Coordinators: Convey your RC’s majority vote.
Summary - 4

A report of the strategy you implemented is NOT a research paper even though it may contain a good idea.

To be considered as an acceptable research paper:
1) You need details that show why your strategy is different from existing research on that strategy.
2) You need to establish systematic evidence that the idea works beyond saying that “My students seem happy / learning”
Overall Summary: What is not an ET research paper?

This is so important that it is worth repeating the following:

• Compilation of obvious solutions is NOT a research paper.

• A report of the strategy you implemented is NOT a research paper.

• Use of an ET tool in a routine manner is NOT a research paper.

• Mere development of instructional material is NOT a research paper.
What is in an ET research study?
Your research study and paper must have

| Novelty       | Analysis of prior work to show that your idea is unique |
What exactly is meant by ‘Novelty’?

Dictionary: “The quality of being new, unique, original, innovative”

What has to be novel? → At least one of the below:
• Your Problem – The T-L problem you are trying to solve
• Your Solution – Strategy to solve a known problem.
• Your Domain – Adapt a known solution to your context

Can a non-innovative strategy be developed into a strong research paper?
• Yes, provided it is positioned well (See next slide).
Your research study and paper must have

<table>
<thead>
<tr>
<th>Novelty</th>
<th>Analysis of prior work to show that your idea is unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning</td>
<td>Analysis to show that your research study work is required, how your work advances the state of art</td>
</tr>
</tbody>
</table>
What exactly is meant by ‘Positioning’?

Dictionary: “situation/relation with respect to others”.

How to do positioning? → Do both of the below:

1) Have you shown analysis of related prior work to bring out the gaps?
   • papers that have addressed a problem similar to yours
   • papers that have a solution approach similar to yours

2) Does your solution address any of the gaps above?

As the novelty of your problem or solution decreases, the accuracy of your positioning must increase!
## Explain the relation to other work clearly

<table>
<thead>
<tr>
<th>Awful</th>
<th>The galumphing problem has attracted much attention [3,8,10,18,26,32,37]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad</td>
<td>Smith [36] and Jones [27] worked on galumphing.</td>
</tr>
<tr>
<td>Poor</td>
<td>Smith [36] addressed galumphing by blitzing, whereas Jones [27] took a flitzing approach</td>
</tr>
<tr>
<td>Good</td>
<td>Smith's blitzing approach to galumphing[36] achieved 60% coverage [39]. Jones [27] achieved 80% by flitzing, but only for pointer-free cases [16].</td>
</tr>
<tr>
<td>Better</td>
<td>(Good Above) + We modified the blitzing approach to use the kernel representation of flitzing and achieved 90% coverage while relaxing the restriction so that only cyclic data structures are prohibited.</td>
</tr>
</tbody>
</table>

Source: Mary Shaw, Writing good Software Engineering Research Papers, ICSE 2003
Activity: Identify Novelty and Positioning

**THINK:** Based on the abstract below, identify one way in which this paper is different from related work

**PAIR:** Check your neighbor’s answer – have they found the same gap?
Activity: Identify Novelty and Positioning

THINK: Based on the abstract below, identify one way in which this paper is different from related work

PAIR: Check your neighbor’s answer – have they found the same gap?

Abstract. Mental Rotation (MR) ability is important in various fields ranging from art and education to engineering. MR ability can be improved by computer-based training. Most existing techniques require weeks of training and are based on proprietary software. We developed a 3-hour training module using Blender, a 3D open source software. In this paper, we present experimental details of the effect of our training on the improvement of MR ability. Participants were 42 first year engineering students. We used Vandenberg's Mental Rotation Test for pretest and post-test. We found the results to be statistically significant, leading to a large effect size. We also found that females and low achievers are more likely to benefit by such training.
Activity: Identify Novelty and Positioning

THINK: Identify one way in which this paper is different from related work

PAIR: Check your neighbor’s answer – have they found the same gap?

SELF-ASSESS: As a pair, check if you found the following aspects of novelty & positioning in the abstract.
Abstract. Mental Rotation (MR) ability is important in various fields ranging from art and education to engineering. MR ability can be improved by computer based training. Most existing techniques require weeks of training and are based on proprietary software. We developed a 3-hour training module using Blender, a 3D open source software. In this paper, we present experimental details of the effect of our training on the improvement of MR ability. Participants were 42 first year engineering students. We used Vandenberg's Mental Rotation Test for pretest and post-test. We found the results to be statistically significant, leading to a large effect size. We also found that females and low achievers are more likely to benefit by such training.
Abstract. Mental Rotation (MR) ability is important in various fields ranging from art and education to engineering. MR ability can be improved by computer based training. Most existing techniques require weeks of training and are based on proprietary software. We developed a 3-hour training module using Blender, a 3D open source software. In this paper, we present experimental details of the effect of our training on the improvement of MR ability. Participants were 42 first year engineering students. We used Vandenberg's Mental Rotation Test for pretest and post-test. We found the results to be statistically significant, leading to a large effect size. We also found that females and low achievers are more likely to benefit by such training.
What is in an ET research study?
Activity - Think-Pair-Share (~15 min)

Recall the lesson plan that you wrote yesterday, and your answers to - What will you do? What your students will do?

Think: How will you find out if your idea is working?
Specifically write down what you expect to see if your idea is ‘successful’. Write many statements like:

I think my idea is ‘successful’ if I find that
1. My students are doing ___________
2. My students are feeling ___________
3. I am doing ___________
4. I am feeling ___________  (~3 minutes)
Activity - Think-Pair-Share

Pair: Examine your neighbour’s answer.

1. Suggest more statements that your neighbour could add to his/her answer that may indicate ‘success’ of the idea.

2. **Together**, select any two statements and determine how you will measure the extent of the ‘success’.

(7 minutes).
Activity - Think-Pair-Share

**Share:** Share your answer with your colleagues. Mention both ‘what is to be measured’ and ‘how it is to be measured’. (~3 minutes).

**Coordinators:** Share the most common answer through A-view chat. (~2 minutes).
Research Questions (RQs)

A research study contains research questions, and its answers, accompanied by evidence.

Example: If you have identified a teaching-learning problem, and come up with a solution for that problem, the research questions in your research study would be about - how well does your solution address the problem.
Research Questions (RQs)

A research question:

1) Expresses relation between variables, in a specific context.
NOT an RQ: Are animations effective?
Research Questions (RQs)

A research question:

1) Expresses relation between variables, in a specific context.
   NOT an RQ: Are animations effective?

2) Stated clearly in question form, not as a statement.
   NOT an RQ: The purpose of my study is to gather data to support my idea of showing animations.
Research Questions (RQs)

A research question:

1) Expresses relation between variables, in a specific context.  
NOT an RQ: Are animations effective?

2) Stated clearly in question form, not as a statement.  
NOT an RQ: The purpose of my study is to gather data to support my idea of showing animations.

3) RQ must imply possibilities of empirical testing  
NOT an RQ: Should one use animations in primary school classrooms?
Research Questions (RQs)

A research question:

1) Expresses relation between variables, in a specific context.
   NOT an RQ: Are animations effective?

2) Stated clearly in question form, not as a statement.
   NOT an RQ: The purpose of my study is to gather data to support my idea of showing animations.

3) RQ must *imply* possibilities of empirical testing
   NOT an RQ: Should one use animations in primary school classrooms?

RQ: Are animations more effective than still visuals for conceptual understanding of electromagnetic fields?
Example 1. Improvement of Mental Rotation Ability using Blender 3D, T4E 2012

Abstract. Mental Rotation (MR) ability is important in various fields ranging from art and education to engineering. MR ability can be improved by computer based training. Most existing techniques require weeks of training and are based on proprietary software. We developed a 3-hour training module using Blender, a 3D open source software. In this paper, we present experimental details of the effect of our training on the improvement of MR ability. Participants were 42 first year engineering students. We used Vandenberg's Mental Rotation Test for pretest and post-test. We found the results to be statistically significant, leading to a large effect size. We also found that females and low achievers are more likely to benefit by such training.

• RQ: Does a 3-hour Blender training improve the mental rotation ability of first year undergraduate engineering students?
Example 2. TPS in a Large CS1 Class: Does Learning Really Happen? *ITiCSE 2014*

Think-Pair-Share is recommended as an active learning strategy to foster classroom engagement and learning. There is a lack of research-based evidence in CS education on the benefits of TPS. In this study, we investigate the effectiveness of TPS in a programming course. We performed a quasi-experimental study and found that students who learned via TPS performed significantly better on a post-test than students who learned the same concept via lecture. We also conducted a survey and focus group interviews to understand student perceptions of learning with TPS. The majority of students agreed that TPS activities helped improve their conceptual understanding.

**RQs:**
1) Do TPS activities lead to increased conceptual understanding and application of programming concepts?
2) What are the students’ perceptions of learning with TPS?
Ex 3. Program visualization: Effect of viewing vs. predicting on student learning

RQs:
• Does prediction activity with a visualization lead to higher levels of learning than simply viewing the visualization?
• What are student perceptions about learning from visualization with the strategy used?
• What are the differences in learning and perceptions in high achievers compared to low achievers?
Activity – Fastest Finger First

Participants:
1. Revisit your answer to the Think-Pair-Share activity and write one RQ for your ET research study.
   • Note that this should be a ‘Question’, not a ‘Statement’.
2. Quickly pass on your answer to the co-ordinator.

Coordinators:
1. Confirm that the RQ is phrased as a question. If not, ‘disqualify’ that participant!
2. Convey the first ‘valid’ RQ through A-view chat.
Your research study and paper must have

<table>
<thead>
<tr>
<th>Novelty</th>
<th>Analysis of prior work to show that your idea is unique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positioning</td>
<td>Analysis to show that your research work is required, how your work advances the state of art</td>
</tr>
<tr>
<td>Soundness of procedure</td>
<td>Steps to show that you have implemented solution carefully</td>
</tr>
</tbody>
</table>
Activity – Examine ‘Soundness of procedure’

Suppose you implement the following method:
Step 1 – Implement an innovation strategy X in class
Step 2 – Conduct a test to check how well students have done after learning with strategy X
Step 3 – If students do well on test, claim that strategy X works

Will this method establish that strategy X works?

1. Yes
2. No
Activity – Examine ‘Soundness of procedure’

Suppose you implement the following method:
Step 1 – Implement an innovation strategy $X$ in class
Step 2 – Conduct a test to check how well students have done after learning with strategy $X$
Step 3 – If students do well on test, claim that strategy $X$ works

Will this method establish that strategy $X$ works?

1. Yes
2. No

Referee decision – Paper Rejected. Method not sound enough to establish claim.
Research Design

Method:
Step 1 – Implement an innovation strategy X in class
Step 2 – Conduct a test to check how well students have done after learning with strategy X
Step 3 – If students do well on test, claim that strategy X works

The above method is called:
Single group post-test only design
PAIR ACTIVITY:
Why is this research design not sound?

Step 1 – Implement an innovation strategy X in class
Step 2 – Conduct a test to check how well students have done after learning with strategy X
Step 3 – If students do well on test, claim that strategy X works

Participant-pairs:
Come up with one reason why the above steps of research are considered to be an unsound method to establish that strategy X is effective.
Why is *single-group post-test only* research design not sound?

- The outcome could have occurred due to a reason other than the treatment
- There is no comparison to a group that did not receive the treatment
- The outcome could have existed even before the treatment occurred
- There is no control of other possible influences on the outcome
# Problems with single group post only research design, and potential solutions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Potential solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no comparison to a group that did not receive the treatment.</td>
<td>Compare a group that got ‘my strategy’ with a group that did not (Two group post test design)</td>
</tr>
</tbody>
</table>
# Problems with single group post only research design, and potential solutions

<table>
<thead>
<tr>
<th>Problem</th>
<th>Potential solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>There is no comparison to a group that did not receive the treatment.</td>
<td>Compare a group that got ‘my strategy’ with a group that did not</td>
</tr>
<tr>
<td></td>
<td><em>(Two group post test design)</em></td>
</tr>
<tr>
<td>The outcome could have existed even before the treatment occurred.</td>
<td>Compare performance of group before and after the treatment: check how much result</td>
</tr>
<tr>
<td></td>
<td>changed after the treatment</td>
</tr>
<tr>
<td></td>
<td><em>(Single group pre-post design)</em></td>
</tr>
</tbody>
</table>
Your research study and paper must have

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Novelty</td>
<td>Analysis of prior work to show that your idea is unique</td>
</tr>
<tr>
<td>Positioning</td>
<td>Analysis to show that your research work is reqd, how your work advances the state of art</td>
</tr>
<tr>
<td>Soundness of procedure</td>
<td>Steps to show that you have implemented solution carefully</td>
</tr>
<tr>
<td>Evidence to support claim</td>
<td>Data to show that your solution works as claimed</td>
</tr>
</tbody>
</table>
What is ‘Evidence to support claim’?

You have to decide what to measure in your study, that you will show as evidence.

The data you gather should be in sync with the goal of your study and research questions.
Mental Rotation (MR) ability is important in various fields ranging from art and education to engineering and technology. MR ability can be improved by computer based training. Most existing techniques require weeks of training and are based on proprietary software. We developed a three-hour training module using Blender, an open source software. In this paper, we present experimental details of the effect of our training on the improvement of MR ability. Our sample was 42 first year engineering undergraduate students and we used Vandenberg's Mental Rotation Test for pretest and post-test. We found the results to be statistically significant, leading to a large effect size for the entire sample. We also found that females and low achievers are more likely to benefit by such training.
TEL Metrics – What to measure?

An ET research study based on your idea can have different goals. You can focus on one or two of:

- **Effectiveness** - improving learning of concepts or skills.
- **Attractiveness** - enhancing students' engagement, motivation, confidence, affective states.
- **Accessibility** - scaling a solution to larger groups, different types of learners, different contexts.
- **Efficiency** - saving time (individual or for a group), or money or other resources in the system.

Caution: Do not attempt all four metrics in the same study.
Activity - A-View Poll (2 minutes)

Question: Revisit the RQ that you wrote in the previous activity. Which TEL metric does it best correspond to?

1. Effectiveness – Improving learning.
2. Attractiveness – Enhancing engagement, etc.
3. Accessibility - Scaling to different scenarios.
4. Efficiency – Saving time or resources.

Participants: Vote on the question above.

Coordinators: Convey your RC’s majority vote as your response for A-view poll shown.
Instruments – How to measure?

- **Tests** – are commonly used instruments for measuring the TEL metric of Effectiveness - improvement in learning of concepts or skills. See example on next slide for some Do’s and Don’ts.

- **Survey Questionnaires** – are commonly used instruments for measuring the TEL metric of Attractiveness - enhancement in students' engagement, motivation, confidence, affective states.

- **Focus group interviews, Observation protocols, and other instruments** – are beyond the scope of this workshop!
<table>
<thead>
<tr>
<th>Effectiveness of learning</th>
<th>Chosen metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement of learning of specific concept</td>
<td>Evidence needed</td>
</tr>
<tr>
<td>Performance on a test related to the concept before and after the treatment</td>
<td>What data to collect</td>
</tr>
<tr>
<td>Standardized test having conceptual and reasoning questions related to the concept.</td>
<td>Chosen instrument</td>
</tr>
<tr>
<td>Use a typical final exam containing only recall or describe questions.</td>
<td>What NOT to do</td>
</tr>
</tbody>
</table>
### Example – Measuring learning of skill

<table>
<thead>
<tr>
<th>Effectiveness of learning</th>
<th>Chosen metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement of a skill such as programming ability</td>
<td>Evidence needed</td>
</tr>
<tr>
<td>Performance on a programming or debugging question</td>
<td>What data to collect</td>
</tr>
<tr>
<td>Ask students to write a program to solve a specific program; give an erroneous program and ask students to debug the code till it gives a desired output</td>
<td>How to measure</td>
</tr>
<tr>
<td>Analyze number of errors in the program, classify them as syntax errors and logical errors</td>
<td>How to analyze</td>
</tr>
<tr>
<td>Ask Recall or understand level questions such as “What is a variable?”</td>
<td>What NOT to do</td>
</tr>
</tbody>
</table>
## Example – Measuring student engagement

<table>
<thead>
<tr>
<th>Attractiveness</th>
<th>Chosen metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student engagement</td>
<td>Evidence needed</td>
</tr>
</tbody>
</table>

- Students’ perception of their interest in the course format; Other measurements are attendance and participation rates, students’ time-on-task.

- Questionnaire to measure perception of interest, for example on a Likert scale. Observations for time-on-task.

- Frequency distribution of Likert scores (Number of Strongly Agree … Strongly Disagree)
### Example - Constructing perception surveys

<table>
<thead>
<tr>
<th>Instead Do</th>
<th>Don’t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask questions related to what you want to measure – for example, students’ perception of engagement or their own learning</td>
<td>Do not simply ask – Did you like / dislike it?</td>
</tr>
<tr>
<td>Ask many specific questions related to what you want to measure</td>
<td>Do not ask a single leading question - Is the method interesting?</td>
</tr>
<tr>
<td>Preferably use a scale / rating / ranking, (you can include additional open questions to support rating questions)</td>
<td>Do not only include open descriptive questions (analysis is hard)</td>
</tr>
</tbody>
</table>
Overall Summary

Recall key points of this session:

What is not ET research?

- Mere development of instructional material is not ET research.
- Use of an ET tool in a routine manner is not ET research.
- A report of application of an ET strategy is not ET research.

What are some features of ET research?

- Identify Research Questions of your study.
- Use established TEL metrics for evaluation of your study.
- Gather data using appropriate instruments – Tests, Surveys, etc.
- Go at least one step beyond “the routine” (How? Read papers!)
What next – 1) Refine your study in HW

Read the Research paper uploaded on Moodle, and answer the questions in the Worksheet.

• *This will help you refine your idea as below.*

1. Write down two RQs for your ET research study, corresponding to your lesson plan idea.
2. Identify the TEL metrics that are appropriate for your RQs. ➔ What will you measure?
3. Identify the instruments that are appropriate for your metrics. ➔ How will you measure?
4. Upload your Moodle Assignment - *Refine your ET research study*
What next - 2?

Those interested in executing their idea and carrying out the corresponding ET research study should:

• Register on the “Misson2015” forum in Moodle.
• Attend the IEEE conference on Technology for Education - T4E 2015 - to be held at NIT Warangal, Dec 2015.

We will provide mentoring for:

• Executing the ET research study, data collection and analysis.
• Writing a research paper on your idea for T4E 2015.

Download and Use Templates:
http://www.et.iitb.ac.in/ResearchResources.html
How do I ensure that my ET research study meets the criteria?

Research Stage

Planning → Conducting

Intervention + Analysis → Reporting

Template

IPT → SPT

PPT → PWT

Criteria

Novelty and Positioning → Soundness of Procedure

Evidence for claims → Coherence of work
1. Idea Proposal Template (IPT) - helps you explore if your idea is suitable for a research study.

2. Study Planning Template (SPT) - helps you plan the research study around your idea.

3. Paper Planning Template (PPT) – helps you plan the flow and ideas that will go into your paper.

4. Paper Writing Template (PWT) – helps you plan the paragraphs that will go into your paper.
Where can I get these templates?

Download from http://www.et.iitb.ac.in/ResearchResources.html

Also see
Guidelines for planning, conducting and reporting ET research