Appendix I

Science Teaching Competence Scale (STCS)

Name : 
Sex : Male / Female

Dear student-teacher,

Please read the following items carefully and encircle the choice that best describes the way you are when you are teaching science in the class. Attempt all the items without any omission.

1. Identify the suitable statement from the alternatives given below which represents one of the goals of teaching science.
   a. Evolving a suitable design of instruction for teaching concepts in science.
   b. Making students understand the concepts in science.
   c. Making a teacher how to teach the concept in science.
   d. Learning the concepts in science.

2. Which one of the following components is most important for writing goals in teaching cell division in biology?
   a. Division of cells in the mitosis
   b. Different developmental stages of a plant.
   c. Division of cells in the Meiosis
   d. Formation of cell wall

3. Which of the following may be considered as predominant objective of a science teacher in the context of teaching?
   a. Trying to deal with core scientific ideas that have the greatest importance.
   b. Selecting science curriculum on core scientific knowledge.
   c. Adopting scientific inquiry as a part of the core of scientific knowledge.
   d. Decreasing the coverage of non-core scientific knowledge.

4. Which one of the following represents the general instructional objective of teaching science?
   a. Linking the concepts with different areas of science.
   b. Mastering the concept in science
   c. Selecting the suitable instructional design
   d. Demonstrating the concept in science.
5. The objective of teaching the concept of osmosis is
   a. To make students understand the science behind the uptake of water and nutrients by plants.
   b. To make students understand the definition of osmosis
   c. To learn the physiological process of diffusion of solutes.
   d. To demonstrate the osmosis experiment using potato osmoscope.

6. First process of instruction is
   a. Organizing
   b. Teaching
   c. Planning
   d. Monitoring

7. Planning to teach a concept in science within a stipulated time is
   a. Important and has to be strictly adhered
   b. Important and need not be strictly adhered
   c. Important and sometimes be adhered.
   d. Not important

8. Before the concept is taught it is to ascertain
   a. the previous knowledge pertaining to the concept
   b. the value of the concept
   c. difficulty level of the concept
   d. knowledge of the concept

9. If a concept in science is not understood then
   a. other resources are to be referred
   b. the concept is gone through again
   c. the discussion is mooted
   d. the concept is given up.

10. Which one of the following concept formations has to take place in students while learning osmosis?
    a. Lower concentration solutes enter to that of higher concentration.
    b. Higher concentration solutes enter to that lower concentration.
    c. Lower concentration solutes will not enter to that of higher concentration.
    d. Lower concentration solutes and higher concentration solutes exchange with each other.

11. If the pollen grain of the flower is placed on the stigma of another flower of different species then
    a. Pollination does not take place
b. Pollination takes place
c. hybridization occurs
d. fertilization takes place

12. Which one of the following statements is incorrect?
a. Reproduction of the cell is necessary to the survival of species.
b. A single fertilized cell will become a big tree containing millions of cells.
c. DNA controls the structure and function of a cell.
d. There is no difference between animal and plant cells.

13. Students will be reinforced by a teacher of science if
a. he/she uses positive verbal.
b. he/she uses positive gesture.
c. he/she teaches science through appropriate instructional methods.
d. he/she is given valuable reward.

14. The learning outcome of the students is ascertained by a teacher of science by
a. testing the students whether they have understood what is taught.
b. the marks secured by the students
c. assessing the students’ achievements in their learning objectives.
d. asking questions on relevant subjects

15. The instructional design according to a science teacher can be defined as
a. a self correcting systems approach that seeks to apply scientifically derived principles to the planning, design, creation, implementation and evaluation of effective and efficient instruction.
b. a scientific process of translating general principles of learning and instruction into plans for instructional materials and learning.
c. a process, discipline, science and reality.
d. a science of creating detailed specifications for the development, evaluation and maintenance of situations which facilitate the learning.

16. Which of the following skill is most important to be possessed by a teacher of science to teach the concept of pollination
a. Skill of demonstration
b. Skill of explaining
c. Skill of providing multi-sensory experience
d. power of expression and mastery of language
17. Which one of the following ways is effective in recalling the previous knowledge to introduce the concept cell division in science?

a. Fission and fusion
b. Nuclear division
c. Chromosomes
d. Spindle formation

18. Which one of the following is the most important instructional skill of a science teacher

a. Formulating objectives.
b. Content planning.
c. Identifying appropriate teaching technique.
d. Knowledge of implementing the teaching strategies.

19. A science teacher can be best described as

a. Fact teller.
b. Expert.
c. Developer of teaching strategies
d. Co learner.

20. Which is the suitable method for teaching osmosis?

a. Chalk and talk method
b. Power point presentation
c. Lecture cum demonstration
d. Video assisted instruction

21. Which of the following is most appropriate instructional technique for clarifying the types and modes of pollination?

a. Graphic organizer or concept map.
b. Experiential learning
c. Computer assisted instruction
d. Web based instruction

22. Who is an effective science teacher?

a. One who is organizing the co operative students group that reflect intellectual, gender and cultural diversity
b. Possessing problem solving skill slightly beyond what students have.
c. Using science concepts as context for students.
d. Using guided enquiry teaching strategies that lead learners to continue developing and modifying their knowledge.
23. Which one of the Educational Technologies is most suitable for teaching cross pollination?
   a. Lecture with power point presentation.
   b. Lecture with multimedia.
   c. Lecture with colorful charts.
   d. Lecture with demonstration.

24. A successful technology that could be integrated into science teaching is mostly dependent on
   a. Animation system
   b. Pedagogical ideas
   c. Audio video integration
   d. Internet resources

25. Which one of the following concepts in cell division can be effectively taught through animation?
   a. Layers of a plant cell.
   b. formation of chromosomes at the equator of the cell.
   c. Explaining binary fission.
   d. Organelles of the cell.

26. e-Content is
   a. Video Assisted Instruction
   b. Programmed Instruction
   c. Individualized Instruction
   d. Web based Instruction

27. Identify the concept of osmosis for which image may be suitable for teaching
   a. Concentration of solutes.
   b. Equilibrium stage
   c. Semi permeable membrane.
   d. Diffusion of solutes.

28. Multimedia Technology is chosen by a science teacher only when a concept in science
   a. cannot be explained through chalk and talk method
   b. cannot be explained through demonstration
   c. cannot be taught with diagrams.
   d. cannot be taught through working models.
29. Which one of the following resources will help to collect images and text related to a concept in science to be taught?
   a) www.google.com
   b) www.gmail.com
   c) www.blogger.com
   d) www.youtube.com

30. Which one of the following resources will help to collect video and animation related to the concept in science to be taught?
   a) www.blogger.com
   b) www.youtube.com
   c) www.gmail.com
   d) www.yahoo.com

31. Which one of the following is correct?
   a) e-Content is simply a video based instruction.
   b) e-content is simply an electronic form of a content
   c) e-content is simply an integration of multimedia components into the content.
   d) e-content is an integration of multimedia components into the content with certain pedagogical principles.

32. In which of the following questions preparedness of the students in learning pollination can be brought about?
   i) Do you know how plants reproduce?
   ii) Do all the plants reproduce through pollination?
   iii) Do all the plants need help from external sources for pollination?
   iv) Do you know what is anemophily?
   a. i & ii
   b. i & iii
   c. ii & iii
   d. I & iv

33. Which one of the following need not be an appraisal of a teacher of science during the process of teaching pollination?
   a. Confidence in teaching the content on pollination.
   b. Explaining different modes of pollination at ease.
   c. Making students visualize the different modes of pollination.
   d. Reproducing the definition of pollination.
34. Which of the following can be considered as self monitoring of a science teacher during the process of teaching osmosis?
   a. Knowing the prior knowledge of students about osmosis.
   b. Following the right track in explaining the process of osmosis.
   c. Completing the process of osmosis in time.
   d. Following the chronological order of the process.

35. Which of the following ways does a teacher of science assess himself / herself after completion of teaching cell division?
   a. What could I have done differently to teach the concept cell division?
   b. In what direction my thinking should take me to teach, the concept cell division?
   c. Am I really making my students understand important information about the process of Mitosis and Meiosis?
   d. Do I make them internalize the terminologies in cell division?
Appendix II

Metacognitive Awareness Inventory for science student teachers (MAISST)

Name : 
Sex : Male / Female

Please read the following sentences and choose the choice that best describes the way you are when you are teaching science in the class. There are no right answers—please describe yourself as you are, not how you want to be or think you ought to be. Respond all the items by putting tick mark (✓) mark in the appropriate box without any omission.

<table>
<thead>
<tr>
<th>Items</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<tbody>
<tr>
<td>1. I learn how to collect information pertaining to the taught before I begin to teach the concept in science.</td>
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<td>2. I try to understand how the concepts in science are to be explained.</td>
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<td>3. I think of several alternative strategies to teach a concept in science.</td>
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<td>4. I think of the extent of my prior knowledge related to the taught.</td>
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<td>5. I pace myself while teaching science.</td>
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<td>6. I understand my strength and weakness towards selecting appropriate techniques to teach science concepts.</td>
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<td>7. I think about what I really need to learn before I begin to teach a concept in science.</td>
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<td>8. I think of how well I did teach science.</td>
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<td>9. I set specific goals before I accomplish a task in science.</td>
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<td>10. I slow down when I encounter appropriate knowledge in approaching a concept in science.</td>
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<td>11.</td>
<td>I try to gather what kind of information is most important to remember the terminologies in science.</td>
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<td>12.</td>
<td>I ask myself whether I have considered all the applications of the taught while teaching science.</td>
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<td>13.</td>
<td>I ask myself whether I am good at organizing the information related to the taught.</td>
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<td>14.</td>
<td>I consciously focus my comprehension on each step</td>
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<td>15.</td>
<td>I consciously focus my attention on important terminologies.</td>
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<td>16.</td>
<td>I have specific purpose for each technique I adopt to teach a concept in science.</td>
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<td>17.</td>
<td>I get motivated when I know something more about the concept.</td>
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<td>18.</td>
<td>I think about how well I am doing when I deal with a difficult concept.</td>
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<td>19.</td>
<td>I am good at recalling the required information immediately during the process of teaching.</td>
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<td>20.</td>
<td>I use different teaching strategies depending on the situation.</td>
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<td>21.</td>
<td>I ask myself if there was an easier way to teach the concept after I teach.</td>
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<td>22.</td>
<td>I have control over how well I put the concept across to the students.</td>
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<td>23.</td>
<td>I ask myself how well I am doing while I am teaching a new concept.</td>
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<td>24.</td>
<td>I periodically review the important relationships in the concept.</td>
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<td>25.</td>
<td>I summarize what I have done after I teach the concept.</td>
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<td>26.</td>
<td>I think of referring other resources pertaining to the taught when I find the gap in my understanding.</td>
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<td>27.</td>
<td>I motivate myself to do a task when I need to.</td>
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<td>28.</td>
<td>I am aware of what strategies I use.</td>
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<td>29.</td>
<td>I find myself analyzing the usefulness of strategies while I teach the concept.</td>
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<td>30.</td>
<td>I focus on the significance of new information for teaching a concept.</td>
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<td>31.</td>
<td>I create my own examples to make the taught more meaningful.</td>
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<td>32.</td>
<td>I am a good judge of how well I understand a task.</td>
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<td>33.</td>
<td>I find myself using strategies automatically for teaching a concept.</td>
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<td>34.</td>
<td>I use exclusively Graphic Organizer (Diagrammatic representation) for teaching some concept in science.</td>
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<td>35.</td>
<td>I translate new information towards a concept in my own words.</td>
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<td>36.</td>
<td>I am aware of changing strategies when I fail to reach the solution.</td>
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<td>37.</td>
<td>I organize my time to best accomplish the given task.</td>
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<td>38.</td>
<td>I am aware of breaking down the task in science into smaller steps.</td>
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<td>39.</td>
<td>I focus on overall meaning of the concept rather than specifics.</td>
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<td>40.</td>
<td>I stop and go back over new information that is not clear.</td>
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<td>41.</td>
<td>I check whether I am on the right track</td>
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<td>42.</td>
<td>I ask myself how I should proceed the concept in science.</td>
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<td>43.</td>
<td>I ask myself how well I was able to reach the students.</td>
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<td>44.</td>
<td>I ask myself whether my particular course of thinking produce more or less than I had expected.</td>
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<td>45.</td>
<td>I ask myself whether I could have done differently to make the students understand the taught.</td>
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<td>46.</td>
<td>I ask myself how I apply this line of thinking to teach similar topics in science.</td>
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<td>47.</td>
<td>I ask myself whether I need to teach the concept once again to fill any blanks in understanding of the students.</td>
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<td>48.</td>
<td>I re-evaluate my assumptions pertaining to the taught when I get confused.</td>
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Appendix III

Metacognitive Instructional Design Questionnaire for Student Teachers

(MIDQST )

Name : 
Sex : Male / Female

Please read the following sentences and put a tick mark (√) in the appropriate box that best describes the way you are when you are trying to teach a concept in your subject of interest. Think about a concept that you might teach in the class with special reference to the following:

- What do you do before you teach?
- What do you do while you teach the concept?
- What do you do after you finish teaching the concept?

There are no right or wrong answers – Please describe yourself frankly as you are, not how you want to be or think you are to be.

A - Never  B - Seldom  C - Sometimes  D - Often  E - Always

<table>
<thead>
<tr>
<th>S.No</th>
<th>Items</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>I try to analyse what the learners’ characteristics are towards the task.</td>
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<td>2.</td>
<td>I understand what is the task to be learned.</td>
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<td>3.</td>
<td>I understand the level of difficulty of the task.</td>
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<td>4.</td>
<td>I think about the gaps in my understanding towards the task.</td>
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<td>5.</td>
<td>I formulate learning objectives for the concepts to be taught.</td>
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<td>6.</td>
<td>I look back at the objectives whether they are achievable or not.</td>
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<td>7.</td>
<td>I think of several ways to teach a concept and then choose the best one.</td>
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<td>8.</td>
<td>I create the instructional materials for the teaching concept.</td>
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<td>9.</td>
<td>I look back to see if I created the relevant instructional material.</td>
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<td>10.</td>
<td>I monitor whether I have adopted correct</td>
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<td></td>
<td>procedures for the preparation of Instructional material.</td>
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<td>11.</td>
<td>I think whether I have organized the Instructional materials or I go by sequential order.</td>
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<td>13.</td>
<td>I think about the conduct of formative evaluation for the instructional materials.</td>
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<td>14.</td>
<td>I initiate to revise the instructional materials, if necessary.</td>
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<td>15.</td>
<td>I think about the conduct of summative evaluation for the instructional materials.</td>
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<td>16.</td>
<td>I reflect on how well did I evaluate the instructional materials.</td>
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<td>17.</td>
<td>I reflect on how well the task has been analyzed.</td>
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<td>18.</td>
<td>I reflect on how well the instructional strategy could deliver its goods.</td>
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<td>19.</td>
<td>I reflect on how many objectives were achieved.</td>
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<td>20.</td>
<td>I think about whether I have achieved what I had expected.</td>
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Appendix IV

Check list on Teachers’ knowledge towards ICT and Multimedia components (CLKICTMC)

Name : 
Sex : Male / Female

Dear Student-teacher,

Following are the items pertaining to the Information and Communication Technology and Multimedia components. You are required to respond to all the items very frankly by putting Tick mark ( √ ) in the appropriate box. Your frank responses will enable the investigator to be at your service. It is assured that your responses will be kept confidential and used only for research purpose.

<table>
<thead>
<tr>
<th>S.NO</th>
<th>Items pertaining to the knowledge of ICT and Multimedia components</th>
<th>Yes</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Switching on and starting up the computer.</td>
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<td>2.</td>
<td>Using all the keys on the board.</td>
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<td>3.</td>
<td>Setting up and use speakers with the computer.</td>
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<td>4.</td>
<td>Loading and use a CD –ROM.</td>
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<td>5.</td>
<td>Using a mouse to open and close windows.</td>
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<td>6.</td>
<td>Using a mouse to mark a block of text or part of an image.</td>
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<td>7.</td>
<td>Moving a window by dragging on the title bar.</td>
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<td>8.</td>
<td>Restoring a window from task bar.</td>
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<td>9.</td>
<td>Resizing the window by dragging its edge or corner.</td>
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<td>10.</td>
<td>Managing the screen to multiple windows open.</td>
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<td>11.</td>
<td>Naming your work and saving it on to the hard drive.</td>
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<td>12.</td>
<td>Saving your work into a folder other than the default older.</td>
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<td>13.</td>
<td>Saving and load work to and from a floppy disk.</td>
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<td>15.</td>
<td>Renaming the document.</td>
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<td>16.</td>
<td>Deleting unwanted files.</td>
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<td>17.</td>
<td>Loading new software.</td>
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<td>18.</td>
<td>Burning a CD.</td>
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<td>19.</td>
<td>Entering information using the keyboard and mouse.</td>
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<td>20.</td>
<td>Changing font size, style and colour.</td>
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<td>22.</td>
<td>Viewing layout in print preview.</td>
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<td>23.</td>
<td>Accessing drawing tools.</td>
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<td>24.</td>
<td>Inserting a picture into a document.</td>
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<td>25.</td>
<td>Scanning and save a picture.</td>
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<td>27.</td>
<td>Changing size and cropping pictures.</td>
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<td>28.</td>
<td>Recording and saving sound files.</td>
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<td>29.</td>
<td>Importing other graphics and files Eg. animations.</td>
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<tr>
<td>30.</td>
<td>Creating a document which contains different types of information Eg. Text, Pictures and sounds linked by this.</td>
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<td>31.</td>
<td>Logging on to the Internet.</td>
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<td>32.</td>
<td>Being familiar with different search engines.</td>
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<td>33.</td>
<td>Using a variety of hyperlinks to browse different size.</td>
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<tr>
<td>34.</td>
<td>Copying text and images.</td>
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<td>35.</td>
<td>Downloading a software.</td>
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<td>36.</td>
<td>Installation of a software.</td>
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<td>37.</td>
<td>Downloading a video.</td>
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<td>38.</td>
<td>Downloading an image.</td>
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<td>39.</td>
<td>Downloading an animated program.</td>
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<td>40.</td>
<td>Downloading a text / audio.</td>
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<td>41.</td>
<td>Heard of you lead software.</td>
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<td>42.</td>
<td>Heard of Adolf Premiere software.</td>
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<td>43.</td>
<td>Heard of you tube website.</td>
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<td>44.</td>
<td>Heard of metacafe website.</td>
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Appendix V

Interview Questionnaire on e-content for experts in Educational Technology

Respected Sir/Madam,

You are requested to go through the questionnaire before you observe the e-content. After going through the e-content, you are requested to respond to the following items of the questionnaire and offer your valuable comments frankly on the different aspects of e-content.

Introduction

a) provides relevant information and establishes a clear purpose engaging the listener immediately.
b) describes the topic and engages the audience as the introduction proceeds.
c) is somewhat engaging.
d) minimally engages the listener.
Any other remarks

Content

a) identifies creativity and originality for the purpose of development of the e-content.
b) presents accurate information and concise concepts.
c) provides accurate information concisely.
d) does not provide accurate information.
Any other remarks

Layout and Text elements

a) The whole e-content is easy to read with appropriate use of fonts, size, bullets, italics and bold for headings and subheadings.
b) The e-content is generally not readable with the use of fonts, size, bullets, italics and bold for headings and subheadings.
c) The e-content is often difficult to read due to inappropriate use of fonts, size, bullets, italics and bold for headings and subheadings.
d) The e-content is totally difficult to read due to inappropriate use of fonts, size, bullets, italics and bold for headings and subheadings.
Any other remarks

Delivery

a) is well rehearsed, smooth delivery in a conversational style
b) is rehearsed moderately and smooth delivery
c) appears unrehearsed with uneven delivery
d) is hesitant and uneven
Any other remarks
Use of multimedia
a) All of the photographs, graphics, audio and video create interest and are appropriate.
b) Part of the photographs, graphics, audio and video create interest and are appropriate.
c) A few of the photographs, graphics, audio and video are inappropriate.
d) Photographs, graphics, audio and video are inappropriate and do not create interest

Any other remarks

Graphic, Animation and Music enhancements
a) The graphics and animations used create an effective presentations and enhance what is being said in the e-content.
b) The graphics and animations relate to the audio and reinforce content and demonstrate functionality.
c) The graphics and animations sometimes enhance the quality and understanding of the presentation.
d) The graphics and animations are unrelated to the e-content

Any other remarks

Technical Production
a) Presentation is recorded in a quite environment without background noise and distractions.
b) Presentation is recorded in a quite environment with minimal distractions.
c) Presentation is recorded in a semi quite environment with some background noise and distractions.
d) Presentation is recorded in a noisy environment with constant background noise and distractions

☞ Thank you for sparing your valuable time ☜
Appendix VI

Interview Questionnaire on e-content for experts in Botany

Respected Sir/Madam,

You are requested to go through the questionnaire before you observe the e-content. After going through the e-content, you are requested to respond to the following items of the questionnaire and offer your valuable comments frankly on the different aspects of e-content.

Introduction

e) provides relevant information and establishes a clear purpose leading the listeners to the subject.
f) describes the topic but not leading to the subject.
g) is moderately relevant and leading.
h) minimally relevant and leading.
Any other comments

Content

a) includes all important points and is precisely presented.
b) includes all points but continuity is moderate.
c) includes major points with moderate continuity.
d) is lacking in important information.
Any other comments

Text elements

a) The whole information is relevant and easy to understand with the appropriate animations.
b) Some details are difficult to understand.
c) The information is moderately relevant and difficult to understand.
d) Many information are irrelevant and difficult to understand.
Any other comments
Delivery

a) is well rehearsed.
b) is moderately rehearsed.
c) is unhearsed.
d) is interrupted.
Any other comments

Use of multimedia

a) all pictures, animation audio and video are appropriate and effective in creating interest and understanding.
b) majority of the pictures, animations audio and video are appropriate and effective in creating interest and understanding.
c) few of the pictures animations, audio and video are inappropriate and do not create interest.
d) pictures, animations, audio and video are generally inappropriate and do not create interest.
Any other comments

Graphic and animations

a) The graphic and animations create an effective presentation and enhance understanding of what is being said orally.
b) The graphic and animations are moderately effective in explaining the oral statements.
c) Majority of the graphic and animations do not supplement the oral presentation.
d) Majority of the graphic and animations are unrelated and do not help understand the subject.
Any other comments

Technology and presentation

a) Technology and presentation are very good for imparting the scientific knowledge.
b) Technology adopted is good and presentation is moderately good.
c) Technology is not adequate and presentation is good.
d) Technology and presentation are not adequate.
Any other comments

Thank you for sparing your valuable time