

Preventing Holes in Teeth- Are beliefs justified?



Teaching Guide

The aim of this script is to make the students aware of the social impact of not taking care of their teeth. This creates a link to everyday science and involves them in an investigation. By planning the experiment the students improve their investigation skills and their creativity. The lessons conclude by a discussion on how far beliefs about the ingredients of toothpastes are justified.

This activity relates to:

- a) knowledge about teeth and too enamel
- b) experimentation on foods that can lead to damage to the tooth enamel
- c) causes of tooth decay and making decisions on the best way to prevent tooth decay
- d) knowledge about toothpaste, their ingredients and its effects
- e) planning and performing experiments concerning the abrasive effect and the foaming effect of toothpaste
- f) discussion on the degree of potential danger of substances present in toothpastes.

Lesson Learning Outcomes

Lesson 1

At the end of the lesson, students are expected to be able to :

1. determine suitable sources of information for the task assigned
2. extract meaningful information on teeth and tooth enamel.
3. prepare written notes which can form the basis for a 5 minute presentation

Lesson 2

At the end of the lesson, students are expected to be able to :

1. make a presentation to students in the group
2. undertake experiments on the effects of foods on tooth enamel
3. create a report of the findings and its relationship with tooth decay

Lesson 3

At the end of the lesson, students are expected to be able to :

1. participate in a whole class discussion on tooth decay, its causes and its prevention.

2. plan experiments on comparing the properties of toothpastes related to tooth care

Lesson 4

At the end of the lesson, students are expected to be able to :

1. [after teacher approval of the experimental plan and appropriate measures taken with respect to controls and safety, undertake the experiments
2. create a written report on the experimental observations, interpretations and conclusions

Lesson 5

1. participate in a group discussion on common beliefs about toothpaste and tooth decay and justify any decision related to whether toothpaste ingredients constitute any real danger to health.
2. present the decisions of the group to the whole class

Suggested Teaching Strategy

Preparations beforehand:

Obtain a collection of teeth from human (baby teeth if this is possible) or animal sources.

Collect different brands of toothpaste. Make sure that you have toothpastes both with and without fluoride compounds added. (This in itself can be a starting point for a discussion later on whether to buy toothpaste with or without fluoride compounds. Also this leads to a possible discussion on how this is related to the concentration of fluoride ions in your drinking water at home).

Lesson 1

1. Present the scenario and after a short discussion, divide the class into 5 groups which are distributed as even as possible. Give each group responsibility for one of the first five tasks. The tasks are to find out what:
 1. does tooth-enamel consist of and what are its properties.
 2. kind of food has the potential to damage the tooth enamel. What damage does it cause?
 3. different alternatives are there to protect your teeth?
 4. are the ingredients in toothpaste and their purpose? Try to find out which are the active substances in toothpaste.
 5. what is the effect of the use of fluoride compounds on teeth?

Each member of the group should take notes of their findings and be prepared to make a short, 5 minute presentation to others.

The teacher gives each individual member of the group a number.

Lesson 2

2. In new groups, each member reports on the findings of his/her task. Each of these new groups writes a short report of their collective findings.
3. The groups also write down the questions that have come up during their discussions.

Lesson 3

5. These questions are collected with the reports and form the basis of a question and answer session with students
6. Students plan experiments to be carried out in small groups (2-3 students). If by any chance the students fail to come up with ideas for an experiment you can give them hints like:

How do you think the abrasive action may be measured?

What do you think is the reason for abrasive action?

How could you measure the foaming properties of toothpaste?

What causes the foaming action of toothpaste?

Can you think of any material which could be used instead of enamel?

If they still cannot come up with something advise them to e.g. count scratches on a piece of glass under controlled forms.

Lesson 4

7. When the groups have presented their ideas and the teacher has approved of their plans for the experimental work, the students may perform their investigations. Be aware of the importance of the fact that the test should be a fair one and that the variables are under control.
8. The students record the results of their investigation in a written report.

Lesson 5

9. Students discussing in the groups and finding out about the problems with tooth decay from a personal and an economical perspective; can we believe toothpastes are good when they contain fluorides, surfactants, foaming agents, etc?.

Achieving the Educational Objectives

Objective	This is achieved by
1. social and economical problem with tooth decay	Students discussing in the groups and finding out about the problems with tooth decay from a personal and an economical perspective; how this could be prevented through better eating habits and better use of toothpastes.



2. designing and performing experiments with toothpaste	Students discussing in a group the possible ways to carry out this kind of investigation and how to properly control the variables.
3. practice cooperative report-writing as a member of a team and by participating in group-discussions	This is achieved by the organizing strategies we have suggested as each student has a personal responsibility to report the findings of his/hers group to a new group constellation
4. background of tooth decay from chemical and biological aspects and also the concept of hardness of chemical compounds.	This is achieved by discussing and finding out from different sources the chemical and biological explanations for tooth decay and the effects of toothpaste. In addition, students will also draw conclusions from their experimental results.