

# How can I design a cellular phone that is safer to use?

**Developers:** Rachel Mamlok-Naaman, David Fortus and Charles Dershimer

**Institute:** University of Michigan

**Country:** USA

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**Subject:** Science in context in society - Design-based science

**Grade level:** 10-12 graders

**Curriculum content:** EM Radiation

**Kind of activity:** Critical reading and group activity

**Anticipated time:** 2 lessons of 45 minutes each

**Objectives/Competences:** Group activity and critical reading of an article

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## Assessment tool

### Lesson 1

Assign students to teams of four. For this first activity it is okay to randomly assign students to teams since everyone is new. You may find that you need to rearrange teams if people are not being productive or not getting along.

Tell the students that these teams will exist for the first project and that they will get new teams for the second project. In the second project you can let people have some choice on teams.

### Lesson 2

- A. Pass out the document “Cell phones goals and objectives”
- a. Explain to the students that this new project will have them working with a familiar technology that has some controversial issues

associated with it. Have the students read along while you read the first paragraph to them.

- b. Have the students write their team members names on this form. (We will return to this document at the end of the lesson.)

B. While students are writing their names on the form and coming up with their team name, pass out the “the ‘Wireless Worries’” activity sheet.

C. Explain to students that they will be working to identify facts and opinions on this controversial issue. Tell them that at the end of this activity they should have completed this four-page activity and will turn it in. Remind them that this activity is worth \_\_\_ points.

a. Part 1 Activities

- i. Have them brainstorm for 4 minutes on question A and B of Part 1 in their teams. Walk around to check that all students are writing information down.
- ii. Next poll the teams individually and record the results on the white board. (5 minutes)
- iii. After every team has had their ideas posted, have the students complete part 1C. Walk around to check that students are completing this task. (4 minutes)

b. While students are completing their top three ideas, pass out the “ABC News Article” handout or set up the video.

c. Read over Part 2 with the students and have them complete Part 2 while the video is playing.

- i. Enforce the quiet time while the video is playing or for at least 5 minutes while students read the article. Remind students that most all people need quiet to successfully read or listen for meaning.
- ii. Remind students to look for the safety concerns in the video or the article.

- iii. Students who are done very early can move on to part 3.
- d. Part 3
- i. Have students write complete sentences to the video fact and concept questions. Students can talk to each other on their teams while completing the questions (7 minutes).
  - ii. Walk around to see that students are completing their work. Look for good examples to call upon in the next activity.
  - iii. When most all students have finished, review the answers by calling on at least two students to share their answers.

After the students present, ask the class if they agree with these answers.

Purposefully call on students to see if they agree. Use this technique to get students engaged in the discussion. If you saw students with different answers, call on them to contrast their ideas with the student who first answered.

- iv. Call on a student to draw the diagram he/she made in Part four up on the white board. Make sure students acknowledge that microwaves, a form of electromagnetic radiation, are emitted from the antenna. If the student did not draw waves draw waves on the white board to begin to help the class build a model for representing electromagnetic waves.
- e. Part 4
- i. Have students write sentences describing the safety concerns and their design suggestion. This should be quiet work and tell the students that they need quiet to think and reflect. (7 minutes)
  - ii. Walk around to see that students are completing their work. Look for good examples to call upon in the next activity.
  - iii. After the quiet time, have these sentences checked by another student (5 minutes).

- iv. Call on at least three students to stand up and read their sentences. Ask the class if they agree or if this student should rewrite. (5 minutes)
- v. Tell students to hold on to their work for activity I. Remind them that you will be collecting all student work.

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