Piontkewitz, Y., Kedem, O. and Yarden, A. (1998). Senses and Sensors. (a student text and a teacher guide, The Amos de-Shalit Israeli Center for Science Teaching, grades 8-9, 2nd edition 1999, 3rd edition 2002).

Short summary of the main features

This publication was written in light of the recommendations of the Science and Technology syllabus in Israel "to combine the study of the sciences and technology in junior high school into one integrated subject." This publication is an interdisciplinary learning unit in which topics in biology are combined with physics and technology. The main principles of the sensing process are demonstrated in a unified manner for both living organisms and technological systems (Chapter A). Hands-on technological activities are used to demonstrate mechanisms of action in analogy to the specific biological systems. For example, simple sensors are used to demonstrate the action of senses in the human body and in other organisms. Through the hands-on activities in this chapter, the unified principle of reception of stimuli from the surroundings, which is used throughout the book, is built (Fig. 1 and pp. 15, 31, 35, 37, 48, 52 in the student text). The main principles introduced in the introductory chapters are followed by detailed analyses of the sensing of light (Chapter B) and the sensing of sound (Chapter C) in both biological and technological systems, while learning the basic principles of optics and sound, respectively. The "size scale in nature" (see description of the book: "*A Journey into the Living Cell*") appears throughout the book (i.e. pp. 19, 28, 76, 85, 142 in the student text), demonstrating the levels of organization, from the organism level to the molecular level, which are involved in the specific sensing process being discussed.

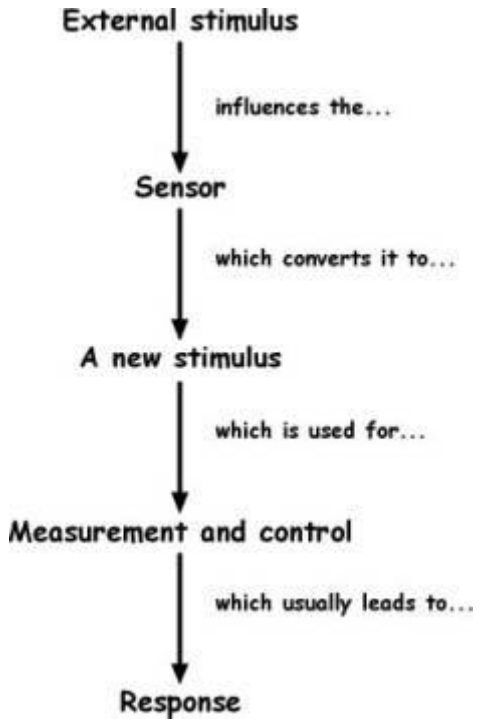

Fig. 1. General scheme demonstrating the principle of the sensing process in living organisms and in technological systems. This scheme is used throughout the student's text: "Senses and sensors" and also appears on the back cover of the book.

The chapters of the student text are:

A. Sensing in living organisms and in technological systems

A-1. Main principles of sensing processes

A-2. Sensing in plants and in unicellular organisms (expanded study)

A-3. Functions of sensing processes

A-4. A mechanical sensor (expanded study)

B. From light to vision

B-1. Feeling the…

B-1(1). Light sensor

B-1(2). The sensing of light in organisms

B-2. About light (expanded study)

B-2(1). The path of light

B-2(2). The complexity of light

B-2(3). Light passes from medium to medium

B-3. From light to image

B-3(1). Light enters the eye and into optical devices

B-3(2). Focusing light

B-3(3). Obtaining an image

B-4. Optical illusions (expanded study)

B-5. Abnormalities in vision systems

C. From sound to hearing

C-1. About sound