Using an interactive method to teach middle school students can address the needs of this diverse population. Electrofiles provide opportunities for students to be actively engaged in learning. Students can build content knowledge in electrical circuits by designing an electrofile or they can review other content area knowledge through a variety of specifically designed file folders. (Author)
Hands-On Minds-On Learning With Electrofiles in Middle Grades

Adele Ducharme and Brenda P. Dixey
Abstract

Using an interactive method to teach middle school students can address the needs of this diverse population. Electrofiles provide opportunities for students to be actively engaged in learning. Students can build content knowledge in electrical circuits by designing an electrofile or they can review other content area knowledge through a variety of specifically designed file folders.
"Nothing is so unequal as the equal treatment of unequals" (Wiles & Bondi, 2001, p. 27). This statement is descriptive of today’s education for the preadolescent learner. A growing body of knowledge indicates that students’ experiences in middle grades influence their success in school and life (Wiles & Bondi, 2001). Therefore, it is essential to use their experiences to address the variety of learning preferences this multifaceted population exhibits on a daily basis. Recognizing the diverse attributes and experiences of these students and addressing their needs through various strategies will help educators recognize "equal treatment" is not desired in the classroom. Interactive hands-on minds-on learning is one method that can be used to meet the diverse needs of middle grade students.

Ruddell (1996) confirms, through a variety of research, “The easiest way to gain and hold students’ interest and attention is by engaging them in intellectually rich activities that require problem solving, language interactions, and active participation” (p. 97). This is much easier said than done in many situations. Teachers are now competing with interactive
games, cellular equipment and other "instant gratification" devices that engage students for brief moments of time, then encourage them to move to the next form of entertainment quite rapidly.

It is the belief of the authors of this paper that most students really do want to learn. They want to be actively engaged in meaningful activities that promote and challenge their problem solving abilities and encourage creativity. They enjoy the interaction among classmates while learning, which according to Vygotsky (1986), is how meaning is derived. Learning does not have to consist of bells and whistles, but must connect with students' experiences, prior knowledge and interests. Students need to know the materials they use will produce the desired result - meaningful learning. It is with that in mind that we decided to use electrofiles in our own teaching as well as encourage K-12 teachers to adapt this concept to their individual classroom situations. Using electrofiles for the purpose of instruction can make reviews of content areas and other skills and knowledge more interesting to students.

Active Learning

Teaching for active learning and transfer of knowledge using hands-on minds-on learning can be accomplished with
electrofiles. It is a tactile tool used to reinforce or enhance skills and content knowledge. The electrofile is an adaptation of electroboard (Carbo, Dunn & Dunn, 1986). The electrofile is composed of two parts, the clipboard lighting system and the file folder that contains the exercise. See Figures 1, 2, and 4. Through this method, middle grades students become actively engaged in reviewing, verifying, or challenging themselves and others in skills and concepts. At the same time the science concept of circuitry can be introduced, reviewed, or expanded while using electrofiles.

Materials needed are clipboard, 9 volt battery, 9 volt battery connector, jumper leads with alligator clips, small 12 volt light bulb, electrical tape, glue, scissors, hole punch, brass paper brads, colored file folder, aluminum foil, paper reinforcements (optional), paper cutter, and wide packing tape.

**File folder**

1. Begin with a colored file folder (use color folder so student can not see through it).
2. Questions and responses should be typed. Cut questions apart and then place one-inch from the left edge of the folder. Place the answers onto the right side of the electrofile one-inch from the edge. Remember to mix up the order of the answers. You may choose to construct the entire design for a page, print it and glue the paper to the file folder. Be sure when designing your page to leave enough space between items and margins from edge so holes may be punched and circuits may be completed.

3. Laminate the file folder.

4. Open up the folder and use a hole punch to make one hole in front of each question/answer on the outer edge of folder. See Figure 2. Holes that are on the right side should be on the outer edge with answers on the inside of the holes otherwise it is difficult to see the questions and answers. If brass paper brads are used, pierce the laminated surface on the playing surface with the points of the brass paper brads. It is best to use brass paper brads when items are in the center of the folder.
5. Turn the folder over and on its back to create circuits made with aluminum foil strips and masking tape or packing tape. Lay strips of aluminum foil (1/2" X 12") connecting each question and its correct answer. Next, use packing tape that is wider than the foil strips to cover each so they completely cover the punched holes and remain permanently fixed. Be sure that each circuit is complete and insulated with the tape before doing the next question/answer circuit. If your design requires triangulation (connecting three items) of questions and answers you may use brass paper brads instead of punching holes. If brass paper brads are used, pierce one end of the aluminum strip onto the brad point for the question and spread the brad points to hold the strip in place. Do the same for the answer. Then apply a strip of tape so that it completely covers both the foil strip and the spread flattened brad points.

6. Check every circuit using the clipboard system to be certain that each is working.
7. Close the folder and tape the sides shut with packing tape so that students may not open up the folder to determine the answers.

**Clipboard System**

1. Place the light bulb in the hole of the clipboard handle. The bulbs come in several colors, red, green, blue, and yellow.

2. Attach one wire lead from the bulb to the 9-volt battery snap cap connector.

3. Cut the 24 inch jumper lead wire in half.

4. Strip insulation from ends of cut ends of jumper lead wires.

5. Next attach the second wire from the bulb to the jumper wire.

6. Attach the second wire coming from the battery snap cap connector to the second jumper lead wire.

7. Wrap electrical tape around the connections where the wires are attached.
8. Connect the battery snap cap connector to the 9-volt battery and glue the battery to the clipboard with the snap cap connector facing the outer edge of the clipboard.

**Using Electrofile to Introduce Circuits**

Electrofiles can be used very effectively in the study of circuits. Have students use the electrofile to determine their level of knowledge about complete circuits. From the pre-assessment the teacher will determine the starting point of the unit of study. The electrofile may be used at any point in the unit to ascertain if students understand the concepts taught. Have students make their own electrofiles concerning concepts learned in the unit to challenge their peers. Also use electrofiles to review vocabulary for the unit such as electrons, negatively charged, positively charged, electricity, circuit, conductors, insulators, series circuits, and parallel circuit.

Make and use electrofiles with any content area or concept. Make several electrofiles and bring active
learning into your middle grades classroom. Electrofiles will energize students' desire to learn.
References


I. DOCUMENT IDENTIFICATION:

Title: Hands-on Mind-on Learning with Electrofiles in Middle Grades

Author(s): Dr. Adele Ducharme; Dr. Brenda P. Dixey

Corporate Source: Valdosta State University

Publication Date: 

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, Resources in Education (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1 Level 1

Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) and paper copy.

THE SAMPLE STICKER SHOWN BELOW WILL BE AFFIXED TO ALL LEVEL 2A DOCUMENTS

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A Level 2A

Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only.

THE SAMPLE STICKER SHOWN BELOW WILL BE AFFIXED TO ALL LEVEL 2B DOCUMENTS

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B Level 2B

Check here for Level 2B release, permitting reproduction and dissemination in microfiche only.

Documents will be processed as indicated provided reproduction quality permits.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Signature:

Dr. Adele Ducharme

Printed Name/Position/Title:

Adele Ducharme Department Head

Date: 12/16/14

Telephone: 229-333-5611

Fax: 229-333-7167

E-Mail Address: Ducharme@valstate.edu

Organization/Address:

Dept. MEd/SED

Valdosta State University

Valdosta, GA 31698

27th Annual National Middle School Association Conf. (St. Louis, MO, Nov. 2-4, 2000). (over)