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## Transparent Globes and Hemispheres: New Scientific Tools—A Preliminary Report

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Investigations are in progress to determine how plastic globes and hemispheres may be designed, prepared, and utilized as scientific tools in classroom instruction, in military application, and in other research.

Thus far, the only large-scale use made of a transparent, plastic globe of large dimension (36 inches in diameter) has been carried out by the United States Air Force ROTC. They are used where world political geography is being taught to 85,000 students annually in its 209 associated colleges and universities. With this globe it is possible to show places in

relation to one another on and through the globe, to trace routes of trade, travel, and bombing on the earth's surface. Paint on the inside will show through and may be used to indicate the spheres of political influence and other geographic features. This analysis indicates that any extension of use of such a plastic device for teaching, strategy, or research might be worthwhile.

S. W. Boggs pointed out the need for transparent, plastic globes with smooth outer surfaces upon which to mark and measure. He stated that some inner layers of plastic which adhere were being developed in France. Boggs stressed the importance of large globes that can be easily disassembled and reassembled. Light weight and ease of carrying are desirable features.

It was apparent from this discussion of need that the transparent globe used by the Air Force ROTC was a forward step for it partially met these requirements. On its surface marks and measurements could be made. Being hollow, inside plastic or paper mache materials might be placed to show geographic features. It was possible to separate the two halves for handling, yet more study on this characteristic would be necessary. With research, a number of practical devices might be designed.

The primary problems for classroom use of plastic teaching devices were these:

1. Which lent themselves better for regular classroom use after research, transparent globes or hemispheres?
2. How could smaller globes or hemispheres of opaque, transparent, or translucent materials be used inside and/or outside the globe and/or hemispheres?
3. What apparatus would be necessary to accomplish the teaching purposes in the form of stands, wall hangings, lights, etc.?
4. How could these plastic materials be manufactured cheaply and uniformly?
5. How could these materials be made with sufficient strength and hardness to withstand normal usage?
6. What additional teaching values would be forthcoming from use of these scientific teaching devices?

Obviously, it was not possible to solve and discuss all of these problems immediately; hence, research was confined to hemispheres as a likely starting point with the thought that they offered the most promise and could be more easily processed. Many of the findings with hemispheres could be projected for use with globes.

It was discovered that the key to successful hemisphere use was a form hemisphere of special design made of opaque, translucent, or transparent plastic or even wire of special design. When desirable, on this form was shown geographic information. Paper and plastic overlays with geographic information were then superimposed. If opaque in nature then only one overlay could be seen at a time, while if translucent or transparent a number of overlays could be put in place. Then an outer plastic cover was superimposed over the outermost overlay. Its purpose was to hold the overlays in place, to allow marking and measuring on a hemisphere surface, and to lend realistic depth to the device.

Inside the form hemisphere was installed a light source (it could be sources). Light rays were also arranged to impinge exterior light on the special light absorbing and reflecting paints in use.

Apparatus necessary included hangings, a turntable for rotation of the hemisphere through 180°, the outer plastic cover fastenings, and the necessary electrical connections. Storage racks were found desirable but not absolutely essential for the overlays. Two hemispheres hung side by side are ideal but one is all that is necessary.

The outer hemisphere cover and/or the overlays may have upraised or indented surfaces, thickened surfaces, layered surfaces, colored surfaces, or special paint or covered surfaces, to make the resultant device more realistic, more readily seen, and more artistic in nature. Also, by utilizing light, from within or without the form, special effects may be created. Not only overlay maps can be handled in this way, but also earth inner layers and pie diagrams as well as other visual materials that lend themselves to hemispherical or circular illustration.

Offered for classroom use, there appear to be at least three possibilities:

1. An opaque form hemisphere on which could be placed opaque overlays and/or translucent and transparent overlays.
2. A transparent or translucent plastic form hemisphere over which could be placed opaque, translucent and/or transparent hemispheres.
3. A wire grid hemisphere over which could be placed opaque, translucent and/or transparent hemispheres.

In practice, a purchaser might start with a cheaper opaque form hemisphere and later replace it with a transparent one. The cheaper opaque overlays might be used alone or in combination with the transparent form and overlays. Ideally, a transparent or translucent form hemisphere would be used with the transparent and/or translucent overlays. It might well prove to users, however, that combinations would be the best of all since the forms would be interchangeable.

Some advantages in the classroom use of plastic hemispheres appear to be:

1. Realistic portrayal of earth features is more nearly reached without the usual distortion of wall maps.
2. Global concepts could be more readily pointed out.
3. Overlays can contain information that it is felt should be emphasized.
4. Overlays would show many more relationships than conventional maps.
5. Overlays can be quickly slipped into place with not more, and possibly even less, effort than handling of ordinary wall maps.
6. Storage space should not exceed that of ordinary maps.
7. Being able to draw on the plastic surfaces is desirable, a feature not ordinarily found in standard maps.
8. Plastic materials may allow changes of political and other lines not possible on the usual maps and globes.
9. The room need not be darkened, except during special light demonstration and even then not unduly so.
10. Such hemisphere devices do not replace wall maps but lend interest in their use and interpretation.

Some disadvantages in use of plastic hemispheres appear to be these:

1. The first cost of installing the hemisphere system would be high as compared with simple roller stick maps.
2. Wall maps would still be necessary.
3. Lack of universality in use would prove a handicap for some time.
4. Re-orientation of the teachers and students in global concepts would be necessary, even though felt desirable.
5. Areas where the two hemispheres come together are not shown as to be seen clearly in relationship to one another.

In this era of global analysis and of three dimensional informational devices, any contribution wherein new materials such as the translucent and transparent plastics can be of use in the classroom, military planning, and research should be reckoned with to seek beneficial applications. Its use in earth hemisphere study and instruction thus far has brought about some promising results which need further evaluation.