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## The Image of the Scientist Among Iowa High School Students

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*Abstract.* One-third of the Iowa high school students sampled in this study have written what is considered an accurate image of the scientist. It appears that the science teachers are not the ones who determine the image that the student has. A call is made for involvement in research at the undergraduate level by prospective science teachers so they might be able to present a more accurate image of the scientist to their students. It is also suggested that an extensive case history study of Iowa scientists be made available for use in Iowa high schools by students and teachers.

Since 1960, every content area of high school science has been the target of at least one nationwide curriculum study group. In every case one of the objectives of the new course is aimed at teaching more about the process of the discipline being taught. The students are to discover science as a human enterprise and composed not only of facts and knowledge but also a process and set of activities carried out by man. The question is, what has this increased emphasis upon the process of science had on the image of the scientist among high school students? Mead and Metreaux (1957) studied the image of the scientist among high school students. In general they found that the image was favorable until it became a question of some sort of personal involvement by the student, then the image was not good. The purpose of this brief study is to make some estimate of the image of the scientist among Iowa high school students today.

### PROCEDURE

During the 1967 academic year over five thousand high school students from all over the United States were asked to write a paragraph giving their image of the scientist. The instructions were as follows:

*In the space below, write a paragraph or two telling your image of the scientist. Include how he proceeds; what he does each working day; what he thinks and what his personal life is like. Include anything else to complete the "image."*

In order to develop some standard by which to judge the many statements collected, a sample of 36 paragraphs were sent to selected scientists in universities and industry and science educators in colleges and universities. They were asked to read the paragraphs and indicate whether they thought the image was accurate or not and secondly, regardless of accuracy, was the image favorable. An excellent response was received, a total of 54 persons were willing to take the time necessary to evaluate the paragraphs. The paragraphs selected as accurate

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images by these evaluators have been used as guides in subsequent evaluations of the many paragraphs available.

Some of the key sentences from paragraphs that were selected as accurate images by scientists and science educators are given below. These are the types of phrases looked for by this investigator in making the evaluations of the paragraphs used in this study.

A scientist is normal in his personal life. He must be creative and yet honest in his interpretations. My idea of a scientist is a person who pursues knowledge just because he wants to know why this or that happens. Of course, there are disadvantages, the sometimes tedious research and disappointment, but the scientist's life seems to represent a worthwhile goal. His day can be from a specific starting time and be routine or it can be planned by himself as to what he should accomplish day by day.

Some of the phrases from paragraphs that were considered to be quite inaccurate by the scientists are given below.

When a scientist does an experiment he is like a good cook and he gets everything he needs ready before he begins. A scientist doesn't have much of a social life because he is always busy and has a one-track mind. He is an old man with spectacles, mustache and gives an unhealthy appearance. Most scientists are single, so they live a very promising life. He is single and plans to be for the rest of his days! I think of a scientist as a man with a long white coat, long hair falling in his eyes and a test tube in each hand.

One comment most frequently given by the scientists and science educators making these preliminary evaluations was that with a given paragraph a student may often write sentences that are very accurate and follow with a sentence that has no accuracy whatever. It was also interesting to note that students within the same high school class with the same teacher could write paragraphs that range the entire spectrum from totally inaccurate to quite accurate. One of the groups of paragraphs evaluated in this preliminary set were written by a group of high school students who were taught by university science professors during a summer institute. It was encouraging to note that the "image" paragraphs written by this group of students were considered quite accurate by the scientists doing the preliminary evaluation.

For this specific phase of the "image" study, that dealing only with the image of the scientist among Iowa high school students, the following procedure was used. Five hundred thirty-two paragraphs were collected from 16 different Iowa schools. These included students under the supervision of 21 different science teachers and ranging from grades 9 to 12. The paragraphs were read and evaluated by this investigator. Each paragraph was judged for accuracy and regardless of accuracy whether a favorable image was given. The evaluations of

the working scientists and science educators mentioned earlier served as a guideline for these judgments. It was also assumed that there is no *one* accurate image of the scientist, thus allowing for great latitude in what was considered an accurate image. The results of this evaluation of the Iowa images is given below.

ACCURATE		FAVORABLE	
Yes	No	Yes	No
192	340	362	170
36%	64%	68%	32%

Some of the most frequently mentioned ideas were as follows (not all are word for word from the paragraphs).

He bores his family with big words. A careful worker. Devoted to his work. Dedicated. Reads a lot in leisure time. Amazes his family with chemical experiments and bright colored compounds. Seldom makes mistakes. Outdoor type: fishing, hunting and golfing. Looking for new cures. Should be thankful for scientists, make the world a good place to live in. Less than 1 percent mention women as scientists. Long hours, not much spare time. Must have a considerate family to put up with his being away so much. Experiments at home, must have peace and quiet from family. White coat, horned rimmed glasses and is a genius. No time for a family, usually single. Desires to know all the answers in the world. His kids are probably good science students.

#### SUMMARY

1. Based on this small sample of Iowa high school students it appears that the image of the scientist is not as good as we could expect. Only 36 percent of those responding were judged to have written an accurate image of the scientist.

2. Perhaps the most striking point is the fact that students from the same high school, taking the same science class from the same science teacher, will write images that cover the entire spectrum from accurate to inaccurate and from favorable to unfavorable. This would lead one to think that the average classroom teacher does little to develop the image of the scientist.

3. Again as was found by those involved in the earlier evaluations, many students would write sentences that were quite accurate and the next sentence may be totally unacceptable as accurate. The image seems to be a jumble of science fiction, television and information from texts and teachers.

Several high school students wrote that they have never met a scientist and indicated that they would like to do so. I suspect that very few of the science teachers have ever really worked long enough with a scientist to get to know much about him. Most frequently it is a

case of the university professor in front of the class, seeming to know all the facts and answers. Very seldom does a prospective teacher get behind the scene and see a professor in his laboratory or at home with his family.

What can be done to improve the image of the scientist at the high school level? The following two suggestions are made.

1. Provide prospective science teachers with at least one semester of experience where they become involved with some real science research under the guidance of a working scientist.
2. Someone or some group should develop an extensive case history study of 50 to 100 working scientists at universities and in industry in the state of Iowa. It should include photos of the scientist at work and at play. It should show them with their families if they have families. It should provide some real and factual information that can be used by high school students and their science teachers to better understand who and what the scientist is.

#### Bibliography

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