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Abstract

The primary objective of the study was to determine whether *Futures*, the quarterly magazine of the Michigan Agricultural Experiment Station (MAES), has helped high school science teachers gain a greater awareness and understanding of agricultural and natural resources research.

Michigan High School Science Teacher Perceptions Of *Futures* Magazine As A Pedagogical Resource And Career Exploration Tool

Murari Suvedi
Kirk Heinze
Maxine Ferris

The primary objective of the study was to determine whether *Futures*, the quarterly magazine of the Michigan Agricultural Experiment Station (MAES), has helped high school science teachers gain a greater awareness and understanding of agricultural and natural resources research. The secondary objective was to ascertain teacher perceptions concerning whether their students have used *Futures* in career exploration. A pretested questionnaire was mailed to all Michigan high school science teachers receiving *Futures*. The findings indicate that the magazine has increased awareness of MAES research among some high school science teachers and their students. In addition, the teachers believe that *Futures* has been a medium through which some of their students learn about Michigan State University and undergraduate programs in the College of Agriculture and Natural Resources. The findings also suggest that the magazine has helped to somewhat broaden teacher and student perceptions of agriculture and agri-science.

Introduction

Enrollments in most U.S. colleges of agriculture have declined in recent years (Bruene, et al., 1988). At

the same time, U.S. colleges and universities are expected to produce insufficient numbers of graduates with agricultural expertise to fill im-

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portant scientific and professional positions. According to Coulter et al. (1986), there may be as much as a 10 percent gap between the supply of and demand for agricultural graduates through the end of this century. Consequently, agricultural colleges, including the Michigan State University's (MSU) College of Agriculture and Natural Resources (CANR), are looking for better ways to communicate to secondary students the employment opportunities in agriculture and, at the same time, to clear up popular misconceptions that agriculture is tantamount to farming.

As part of a strategy to provide accurate information to secondary students, the Michigan Agricultural Experiment Station (MAES), in conjunction with CANR's Office of Academic and Student Affairs, has been sending *Futures* magazine to Michigan high school science teachers. *Futures*, the quarterly magazine of the MAES, highlights the agricultural and natural resources science research programs of the station. In 1987, *Futures* won a superior rating for "Best of Kind" in the national ACE competition. It is generally viewed by readers as an attractive and informative publication (Brezen, 1983). High school science teachers in Michigan (approximately 400 persons) have been receiving *Futures* since 1985, but no previous effort had been made to evaluate the usefulness or effectiveness of this practice.

Purpose and Objectives

The primary purpose of this study was to determine the extent to which *Futures* has helped high school science teachers gain an awareness and an understanding of agricultural and natural resources research. A secondary purpose was to ascertain

perceptions held by the high school science teachers concerning whether students have used *Futures* in career exploration.

The specific objectives of the study were to ascertain high school science teachers' perceptions of *Futures* in relation to:

- its usefulness in keeping high school science teachers updated on research in the agricultural and natural resources sciences;
- its use in classroom teaching activities;
- its appropriateness as a library resource;
- the extent to which it helps teachers and students gain a better understanding of agricultural and natural resources research;
- its role as a source of information and motivation to students to consider careers in agricultural and natural resources science and to pursue higher education at MSU.

Methodology

This study is descriptive and based on a mail survey questionnaire.

Population

The population for this study was the 387 Michigan high school science teachers receiving *Futures* throughout 1987. Packets containing the cover letter, questionnaire, and a preaddressed, stamped envelope were mailed on April 20, 1988. The cover letter explained the nature of the project and urged teachers to respond promptly. All the questionnaires were numbered, but anonymity was otherwise ensured. Reminder postcards were sent to non-respondents on May 9, 1988, to increase the return rate. Of the 387 questionnaires mailed, 12 were not deliverable and 11 teachers indicated they were not

receiving the publication. Ninety-nine usable questionnaires were returned. The response rate (27.27 percent) was substantially lower than the average return rate for mailed readership surveys (Wimmer & Dominick, 1987; Dillman, 1978). However, a comparison of selected demographic variables (age, teaching experience, gender, and educational level) indicated no significant differences between respondents and non-respondents.

Instrumentation and Data Collection

The questionnaire was designed to collect data about respondents' perceptions of the usefulness of the magazine relative to the objectives stated above. Respondents were asked to indicate the extent of their agreement (using a five-point, Likert-type scale) with 10 statements concerning the use of the magazine in high school science classes. Six of the statements reflected positive perceptions of *Futures*; the other four statements reflected negative perceptions. The mean responses to positive statements were computed based on: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The values were reversed for the negative statements (i.e., 1=strongly agree, 2=agree, etc.). Therefore, any mean score above 3.0 indicated respondent agreement with positive statements and disagreement with negative statement.

Respondents were also asked to indicate (using a six-point, Likert-type scale, 0=not helpful and 5=very helpful) the degree to which they found *Futures* a helpful classroom and career information resource. For each of the seven statements provided, mean values over 2.0 indicated a positive perception of helpfulness.

A panel of experts from the MSU Dept. of Agricultural and Extension

Education established content validity of the survey. The questionnaire was tested for reliability. Cronbach's alpha was 0.73 for questions pertaining to perceptions about the extent of *Futures*' usefulness as a classroom resource and 0.84 for questions about *Futures*' usefulness as a career information resource.

Data Analysis

Measures of central tendency, percentage distribution, and frequencies were computed to describe the readership variables. The mean, standard deviation, and cross-tab frequencies were computed to describe the perceptions held by respondents regarding the extent of *Futures*' usefulness in teaching high school science classes. Data were analyzed using StatPac and SPSS/PC+, the statistical package for the social sciences/personal computer program.

Limitations

Because of economic and time constraints, no follow-up survey of non-respondents was conducted. In addition, the methodology limited the number of questions that could be asked and precluded probing for clarification. Finally, because of the small sample size, findings may not be generalizable to the entire population.

Findings

Respondent Characteristics. A large majority (79.78 percent) of the respondents were male, and about two-thirds (68.7 percent) were between the ages of 35 and 54. Teaching experience ranged from one to 40 years, with a mean of 22.68 years and a standard deviation of 7.77 years. A majority of the respondents were teaching in suburban (28.3

percent), small town (20.2 percent) or rural (20.2 percent) schools. About one-fourth (24.3 percent) worked in cities, and there were five (5.1 percent) missing cases. Most respondents (84.8 percent) have earned master's degrees. About one-half (50.5 percent) completed undergraduate majors in biology. Other baccalaureate majors included chemistry (19.2 percent), mathematics (6.1 percent), physics (4.0 percent), agriculture (4.0 percent) and others (16.2 percent). About one-third (31.3 percent) of the respondents graduated from Michigan State University.

Many respondents teach science courses irrespective of their undergraduate major. About one-third (32.3 percent) teach biology, whereas slightly over one-third (35.4 percent) teach a combination of science courses. A large majority (90.4 percent) of the respondents teach more than one class level.

Readability and Format of *Futures*. The number of issues of *Futures* received by the science teachers surveyed ranged from one to 50, with an average of eight issues received and a standard deviation of 8.11. A majority (51.5 percent) of respondents read most of the magazine, and some (11.1 percent) carefully read all the magazine. About one-third (35.4 percent) skim the magazine. Respondents were further asked what they do when they first receive their copy of *Futures*. Slightly over one-fourth (27.8 percent) read most of the magazine, 28.9 percent read it and pass it to others, and 14.4 percent file the magazine. Only 2 percent said they throw it away without reading it. About two-thirds (64.6 percent) of the respondents mentioned that their copies of *Futures* are read by someone other than themselves. Others reading the magazine

include students, other science teachers, and other teachers. Respondents were asked to rate the style of writing of *Futures* articles. Most (91.9 percent) thought the level of writing is just right; only a few indicated it is either too technical (2 percent) or not technical enough (3 percent). Regarding the range of subject matter coverage, most (90.9 percent) of those responding indicated that the subject matter coverage was just right, and only a few (5.1 percent) viewed the coverage as too narrow. The quarterly publication schedule of *Futures* was considered just right by about half (53.5 percent) the respondents. Over one-third of the respondents (38.4 percent) would like to see it published more often. The layout and design of the magazine were rated either excellent (28.3 percent) or good (67.7 percent).

Usefulness of *Futures*. The publication serves as the major source of current agricultural and natural resources research information for 75.8 percent of the respondents. A large majority (91.9 percent) of the respondents said that *Futures* is helpful in keeping them informed of current agricultural and natural resources research issues.

The data also revealed that *Futures* is the only research-based information magazine received by about three-fourths (75.8 percent) of the respondents. About one-fourth of the teachers (24.2 percent) indicated they receive magazines similar to *Futures* published by other universities. When asked to compare *Futures* with other university publications, most respondents rated *Futures* a better magazine.

In general, high school science teachers have a positive perception of the usefulness of *Futures*. As Table 1 reflects, a majority of the

respondents feel *Futures* is a very useful magazine for high school science teachers. Most teachers (92 percent) feel that some articles in *Futures* are worth copying for class use. A majority (78.8 percent) indicated that all high school libraries should receive a copy of *Futures*, that it is a useful magazine for classroom use (66.6 percent), not difficult for students to understand (67.6 percent), and should be a reference magazine in high school science classes (52.6 percent). A majority (53.6 percent) feel that they should pass on their copies of the magazine to students.

Data in Table 1 reveal that all statements except one have a mean score higher than 3.0, indicating that, in general, science teachers have a positive view of the overall usefulness of *Futures*. However, a large majority (89.9 percent) either agreed

Table 1: Perceptions of science teachers about the usefulness of *Futures* magazine.

Statements	Valid cases	% Agree	% Disagree	Mean score+
<i>Futures</i> is a useful magazine for classroom use.	98	66.6	7.1	3.75
* <i>Futures</i> is too difficult for students to understand.	97	8.1	67.6	3.75
All science teachers in Michigan should encourage students to read <i>Futures</i> .	98	39.4	16.1	3.26
*There are science magazines superior to <i>Futures</i> for classroom use.	97	43.5	10.1	2.61
Some articles in <i>Futures</i> are worth copying for class use.	98	92.0	0.0	4.08
* <i>Futures</i> has a narrow focus that limits its use in classroom teaching.	97	25.2	44.4	3.16
* <i>Futures</i> has few relevant articles for use in my class.	98	30.3	44.5	3.18
<i>Futures</i> should be a reference magazine in all high school science classes.	97	52.6	20.2	3.18
High school libraries in Michigan should receive a copy of <i>Futures</i> .	98	78.8	4.0	3.98
All science teachers should pass on their copies of <i>Futures</i> to students.	97	53.6	11.1	3.49

* Indicates a negative statement.

+ Mean scores were computed by assigning the following values: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree and 5=strongly agree. The scores were reversed for negative statements.

with or were neutral toward the statement: "There are science magazines superior to *Futures* for classroom use." This negative perception might be attributed to the fact that *Futures* is not primarily designed for classroom use, nor is the high school science curriculum limited to the agricultural and natural resources sciences.

Science teachers clearly indicated that *Futures* has been a helpful source of new knowledge and information in ANR sciences (Table 2).

An attempt was made to explore whether the magazine has also helped in CANR student recruitment. A mean score slightly less than 3.0 (based on a six-point scale, 0 = not helpful and 5 = very helpful) on three related statements suggests that science teachers have positive and

moderate feelings about the possible role of *Futures* magazine as a source of information and motivation for their students to learn about MSU, to consider careers in ANR sciences, or to pursue higher education at MSU (Table 2). A moderate score could be attributed to the fact that science teachers have only been receiving the magazine for two years and that they have not yet been able to assess its impact on their students' career selection.

In general, high school science teachers consider *Futures* useful and relevant. When asked whether reading *Futures* has broadened their understanding of agriculture, about one-third (30.3 percent) indicated "considerably" and a majority (60.6 percent) indicated "somewhat." Few responses were noted in the attempt

Table 2:
Perceptions of science teachers regarding the usefulness of *Futures* as an information source for the ANR sciences.

Statements	Perception of help (0 = not helpful, 5 = very helpful)		
	Valid cases	Mean	SD
To what extent has <i>Futures</i> been helpful in providing you with:			
Latest developments in agricultural and natural resources sciences.	97	3.71	0.82
Teaching materials.	96	2.76	1.12
Reference materials.	86	3.35	1.08
To what extent do you think <i>Futures</i> has been helpful as:			
A source of new information related to ANR sciences.	95	3.88	0.86
A source of information for your students to learn about MSU.	96	2.90	1.16
A source of motivation for your students to consider careers in agricultural & natural resources sciences.	95	2.99	1.11
A source of information and motivation to your students to pursue higher education at MSU.	95	2.68	1.14

to determine whether Michigan High School Science Teacher Perception Classes Magazine helped change students' perceptions of agriculture. The findings indicated that *Futures* has been instrumental in changing some perceptions: "It has helped students see agriculture as a science." "They no longer consider agriculture as plowing fields and milking cows." "Agriculture is more high-tech than anticipated, with a wide variety of career opportunities." "There is an interdependence of town and farm"; and "They realize that agriculture is a high-tech industry and no longer a 'down on the farm' small-time business."

Conclusions

The findings of this study indicate that *Futures* has been very to moderately useful to Michigan high school science teachers. It has served as a public relations vehicle for the MSU Agricultural Experiment Station and the research it is conducting. Most science teachers normally read almost all articles in the magazine, and there is also much pass-along readership among students and other science teachers. The level of writing, the range of subjects covered, and the quarterly timing of publication appeal to a large majority of respondents. Almost 40 percent of the teachers would like to see it published more often.

For a majority of science teachers, *Futures* is the major source of information about new developments in agricultural and natural resources sciences. Further, it is the only research-based information magazine received by three-fourths of the teachers. Articles in *Futures* are easy to read and understand, and teachers have frequently used them in the classroom. A majority of the teachers also feel that *Futures* should serve as a reference magazine for all high

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