

Development and Implementation of Genetics to Genomics: A Secondary Education Curriculum to Educate Teachers on the Relevance and Value of Genomics



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Background

In 2006, the Michigan Department of Community Health (MDCH), in collaboration with an educational consultant, created, pilot-tested and disseminated a novel secondary education supplemental curriculum, entitled “Genetics to Genomics.” The curriculum highlights chronic disease and health promotion messages using content that matches state and national benchmarks. It is designed to be **reachable, relevant, and rigorous** for students at all levels.

The objectives of this curriculum are to:

- ◆ Increase awareness in teachers and students that behavioral choices made early in life are important for chronic disease prevention.
- ◆ Encourage biology and health science teachers to progress from teaching Mendelian genetics to introducing their students to genomics and its implications for health.
- ◆ Increase the relevance of genomics and confidence of teachers in this subject matter.



Methods

MDCH staff collaborated with an education consultant to identify relevant content on the role of genomics in common chronic diseases. The consultant then developed a web-based curriculum, entitled “Genetics to Genomics,” based on her 30 years of experience teaching genetics in high schools. The curriculum can be accessed through Michigan’s Genetics Resource Center at www.MIGeneticsConnection.org and includes approximately 45 activities that address:

- Family Health History
- Multifactorial Traits
- Genetic Variation



To promote in-service workshops illustrating the use of “Genetics to Genomics,” a presentation was made to 33 directors of the state’s Math and Science Centers which provide professional development for teachers. Of those in attendance, 27 expressed interest in hosting a workshop in their region.

Hands-on workshops were provided by the education consultant and the MDCH Genomics Educator at various sites statewide to demonstrate the curriculum and use of the website activities to classroom teachers. The workshops were hosted by the Math and Science Centers that had expressed the greatest interest. The workshop included information on the public health impact of common, complex chronic diseases with data focusing on children. Pre and post-test evaluations were administered to evaluate the teachers’ perceptions of knowledge, confidence and importance of public health genomics. A one-year follow-up evaluation was also conducted to find out if the teachers were utilizing the website and curriculum materials in the classroom.

1. Michigan Department of Community Health
2. Education Consultant

Results

Approximately 140 teachers have participated in 14 workshops statewide. Figures 1-4 show the results of pre (◆) and post (■) tests conducted at the workshops. Evaluations measured knowledge, interest, confidence and importance in teaching:

- a. Family History
- b. Multifactorial Traits
- c. Cancer Genetics
- d. Genetic Variation
- e. Microarray Technology

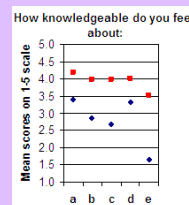
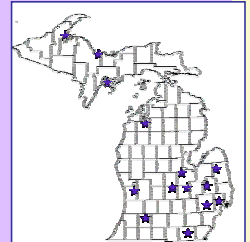


Figure 1

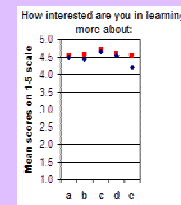


Figure 2

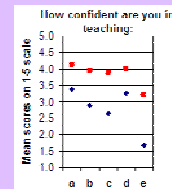


Figure 3

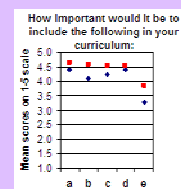


Figure 4

About 96% of all teachers attending a workshop rated it as excellent or near excellent. Unfortunately, response to the one-year follow-up survey was low (less than 10), possibly due to its timing near the end of the school year. Teachers who did respond indicated they had indeed used the website in planning. Those who had not used the site were going to include it in their next year’s lesson plans. The website currently gets an average of 200 page hits per month during the school year.



Discussion

Workshop evaluations indicated that the hands-on approach to this topic and accompanying public health messages did, in fact, significantly increase knowledge, confidence, and importance of teaching genomics. An email group of workshop attendees has been established and contact is maintained at least monthly by the Genomics Educator as a means of disseminating recent research and general communication. As a result, several teachers have attended other genomics-related events brought to their attention through the group. We believe the “Genetics to Genomics” curriculum combined with the workshops represents a successful approach for bringing relevant public health genomics information to Michigan teachers.