



Henry Ford Community College

Technology Investment Fund

Progress Summary

NAME OF PROJECT DIRECTOR		DEPARTMENT/DIVISION
Paul Root		Chemistry/Science
CURRENT DATE	SEMESTER GRANT AWARDED	PROGRESS REPORT STATUS
Sept 10, 2012	Winter 2011	<input type="checkbox"/> Interim <input checked="" type="checkbox"/> Final

PROJECT DESCRIPTION: *A brief summary of the project.*

Henry Ford Community College has a reputation as an institution committed to providing students with a comprehensive, cutting-edge science education while ensuring a personalized educational experience through small class sizes. Modern chemical instrumentation is needed to improve and expand the chemistry laboratory experiments offered at HFCC. Updating and integrating new instrumentation into the chemistry courses generates an enormous amount of interest and enthusiasm among students and demonstrates a return on the time, money and effort our students put into their education. Specifically, the purchase of new DigiMelt melting point apparatuses would provide students with access to experimental data that is not presently attainable, hands-on experience with technically-advanced instrumentation and continuity with this type of apparatus across all chemistry laboratory courses at HFCC.

Melting point analysis is an analytical technique that can be used to help characterize molecules, identify an unknown compound, and evaluate the purity of a product. In this proposal, we are requesting forty-two DigiMelt melting point apparatuses. This would provide three class-sets of instruments and would replace several antiquated versions of melting point apparatuses we currently use. The DigiMelt melting point apparatuses are faster, more reliable and safer than any of the instruments we presently use. These instruments will allow for the enhancement of existing experiments and for the development of novel laboratory activities. Having students use the same instrument across all chemistry courses would provide consistency for our students. It would change the emphasis from learning how to use an instrument to focus more on the chemistry behind an experiment. The DigiMelt melting point apparatuses will help keep the chemistry curriculum at HFCC relevant, up-to-date and competitive with regional institutions. They will help position our students for success as they continue on in academics or career pathways.

ITEMS PURCHASED: *Please indicate how you spent the funds allocated to you. Where are items purchased currently being used? (Attach separate sheet if necessary.)*

SRS DigiMelt Melting Point Apparatus (quantity = 40)	\$ 30,020.00
Shipping and Handling	\$ 225.15
Total	\$ 30,245.15
	\$ 21,800.00 (paid via TIF funding) \$ 8,445.15 (paid via Science Division funds)

26 DigiMelt Melting Point Apparatuses are used in CHEM131, CHEM111, and CHEM141 labs (S-009, S-006 and S-027)
14 DigiMelt Melting Point Apparatuses are used in CHEM132 and CHEM243 labs (H-004)

OUTCOMES EXPECTED: *What were the outcomes/goals expected from the project as listed in your original proposal?*

What is your current teaching method? How will this project fit into your current plan?

Current teaching methods for chemical analysis include lectures, demonstrations, and laboratory experiments. The incorporation of the DigiMelt melting point apparatuses into the science curriculum, particularly into current and new chemistry courses, will provide students with greater opportunities for understanding chemical principles and techniques, while gaining hands-on experience with modern, relevant laboratory instrumentation.

How will this improve student learning? *(List specific goals.)*

As a result of this project students will:

- Develop a deeper conceptual understanding of melting point determination as a critical modern experimental tool
- Gain hands-on experience with a broader range of laboratory activities involving melting point measurements
- Gain hands-on experience with modern chemical laboratory instrumentation
- Develop critical thinking skills through data analysis and identification of unknowns
- Have access to a broader range of research projects (honors students directed study projects)

PROJECT EVALUATION: *Please summarize how the project was evaluated and the result of that evaluation. What evidence do you have that the outcomes/goals were or were not met? Please include data collected--questionnaire results, etc. Were there any benefits you may not have expected? Any liabilities? Please share any strengths and weaknesses of the proposed project--your honesty will be of help to others.*

In this TIF proposal, the success this project was to be largely determined by the level of integration of DigiMelt melting point apparatuses into majors and non-majors level chemistry courses. Successful integration was defined as the use of DigiMelt Melting Point apparatuses in laboratory activities which lead to increased student understanding of characteristic physical properties, intermolecular forces and chemical analysis. The DigiMelt melting point apparatuses have been incorporated into the laboratory activities of CHEM131, CHEM132, CHEM111, CHEM141, CHEM243 and CHEM244. These instruments are now used by 6 full-time chemistry faculty, 10 adjunct faculty, and more than 2200 students per year.

These DigiMelt Melting Point apparatuses are used to (1) assist in identifying unknown compounds based on characteristic melting points, (2) assess the purity of a compound, and (3) monitor the progress of a reaction. Laboratory experiments in CHEM131, CHEM132, and CHEM111 have been adapted/modified in response to the increased capabilities of the DigiMelts. The speed of the DigiMelts allow students to attempt to determine a greater number of "unknown" compounds during a single lab session compared to previous instruments. The increased precision of these instruments have required the selection of new "unknown" compounds with much closer melting points in order to maintain the stringency of the laboratory exercises.

As students progress through their course sequences, and are now using the same melting point apparatus in each of their chemistry courses, we are now recognizing an increase in proficiency, speed and accuracy when measuring melting points. For example, students in one particular experiment in CHEM132 (having successfully completed CHEM131) are now identifying unknown compounds with close to 90% accuracy. This value is higher than values obtained using previous melting point instruments where students would identify unknown compounds with accuracies between 75-80%.

This proposal was written with goals to (1) keep the chemistry curriculum up to date and competitive (2) create new opportunities for student research, and (3) enhance the Biotechnology Program. At this point the DigiMelt has not been used for Honor's research based projects or by the Biotechnology program. The curriculum of the Biotech program is formed following the direction of an Advisory Board consisting of members representing regional Biotechnology laboratories and companies. The need for melting point analysis is not identified as a required skill set from the Advisory Board at this time, however should this change we are well positioned to integrate this type of analysis into our courses. Honor's research based projects over the past four semesters have not required melting point determinations however the opportunity now exists should a project develop that requires this type of measurement. The DigiMelt melting point apparatuses have been very successful in helping keep the majors and non-majors level chemistry curriculum at HFCC up-to-date, relevant and competitive with regional institutions. These instruments not only help students develop an understanding of characteristic physical properties, intermolecular forces and chemical analysis, but the investment in modern instrumentation help demonstrate the value we hold for the learning experience of our students. These instruments help position our students for success as they continue on in academics or career pathways