

CASPiE at College of DuPage

Undergraduate Research at a Two
Year Institution

Susan Shih, Carolyn Dockus, Mary Newberg

Background

COD was invited to participate in the CASPiE grant proposal as one of several two year institutions in collaboration with R-1s & PUIs

Once funded, 3 of 6 full time faculty agreed to work on the project

COD granted additional funds for the project

Initial Concerns

We were converting from quarters to semesters – would CASPiE be too much change?

2 year commuter school – how to convince students of the benefits of working in a group thinking their way through a lab experience – “outside the box”

Recruiting Peer Leaders – students are typically overbooked between school, work & family obligations

Finding PLs for organic – few students who have completed the course are still at the college

Integrating the modules with course content – our regular labs are closely tied to content

Addressing Concerns

All Gen. Chem. Students now keep a duplicate lab notebook from the first lab – no more “fill in the blanks”

More group work in Gen. Chem. 1, lab & lecture

Work with tutoring center as well as our own students to recruit PLs

Most PLs in organic are taking the course themselves

Selected modules that tie in best with course content

Eliminate less important regular experiments

Carry out only 1 module per section

What Are We Doing?

Most PLS attended a group training session with PLs from other schools

Instructors have attended workshops & carried out the modules themselves

Students meet in groups of 3-4 weekly with PLs

Meetings are voluntary but strongly recommended in Gen. Chem. 2 (no recitation sections)

Meetings during lab time in Org. 2

Discussion of next week's lab

Workshops with activities, selected by instructor

Modules

Anti-oxidant Assays in Gen. Chem. 2

ZnO Band Gap Energy in Gen. Chem. 2

Solid Phase Synthesis in Org. 2

Each module carried out over six weeks in
regularly scheduled lab times

New techniques learned in first few weeks

Last half is the research

All students in Gen. Chem. & Organic keep
duplicate copy lab notebooks

At this point, four lab sections have
completed anti-oxidant module this year

Two lab sections will start solid phase
synthesis this week

One lab section will start ZnO band gap this
week

Anti-Oxidant Module

4 lab sections of Gen. Chem. II worked through the anti-oxidant module

PLs in the lab also in 2 sections

Using some of the CASPiE developed PLTL workshop materials for group meetings

Spring Research Projects

Comparison of anti-oxidant capacities of lemons & limes – 2 groups

Comparison of fresh & canned pineapple – 2 groups

Comparison of 3 different roasts of coffee

Comparison of fresh & frozen blueberries

Comparison of fresh, powdered and bottled
garlic

Comparison of fresh & dried oregano

Comparison of fresh, dried and powdered
white onion

Comparison of turmeric and paprika

Experimental Record

Students keep a lab notebook with duplicate copies

Pre-lab includes title, introduction, method and calculations, and outline of the procedure

In lab: specific procedure, observations and data

Duplicates handed in before leaving

Doing Research



ACS National Meeting Chicago March
28, 2007



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Post Lab Analysis

Data analysis and discussion of results

Explanation of results

Summary of work: problems and successes

Reflection: how do the results affect the next
step

Grading

Each week's work from notebook based on a rubric, individual grades

Group report on results of Research Project: hypothesis, procedure and results, data analysis and conclusion

Group poster presentation of results

Results

Attendance in voluntary Gen. Chem.
Workshops 50-85%

Most time in workshops spent on lab
questions

Significant complaining about “extra work”
especially at beginning

Genuine enthusiasm for research portion in
most groups

Research results sent to the researcher who wrote the module

If student data cited in a paper, students listed as contributors

Group dynamics a work in progress – some worked well together, others were problematic

None of PLs had done the module before
but one had served as PL for it last year

PLs enthusiastic – all are working as PLs on
another module

Other two modules went fairly well last year

Solid Phase Organic Synthesis

PLs are students in the course or completed it last year

Last year all PLs were students in the course

Analyses include titration, IR, Raman, TLC and NMR

Some successful results last year

ZnO Band Gap Module

Instructor collaborated on writing module
last year & piloted it

Method is spray pyrolysis carried out on
slides heated on a hot plate

Analysis by UV-Vis spectroscopy

Slides & spectra sent to researcher

Statistics

Since January, 2006, 409 students have taken Gen. Chem. 2

135 of them carried out a research module

169 students have taken Org. 2

66 have carried out a research module

3 of 6 full time faculty are involved in
CASPiE at COD

Results from last year generally positive

Instructors involved doing a module in all of
their sections

Contacts

gweaver@purdue.edu

shihsu@cod.edu

Web site: www.caspie.org

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College of DuPage

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