

WCSE 2011

*Engaging Novice Scholars with the Lure
of Publication: Embedding Research, Writing
and Analytical Skills into the Curriculum*

through an Electronic-Journal Project

PEGGY A. PRITCHARD

Learning & Curriculum Support Librarian
University of Guelph
ppritch@uoguelph.ca

DANIEL F. THOMAS

Associate Professor of Chemistry
University of Guelph
dfthomas@uoguelph.ca

Developing “Academic Literacies”



- Critical thinking; definition of problem in science
- Critical reading, analysis, synthesis; **strategic literature searching**
- Communication of ideas; avoiding plagiarism through **proper citing and referencing**
- Critical review of peers’ writing; providing specific, constructive, respectful feedback

Solution: E-Journal Project

Roles of Novice Scholars



- Embeds analytical skills through true-to-life experience of scientific communication
- Motivates through lure of publication

Multifaceted – 3 Key Aspects



1. Electronic journal
2. Customized, “just-in-time” workshops, tutorials, one-on-one consultations
3. Assessment rubrics

1. *Electronic journal*



- Created by course instructor & librarian
- Uses “open access” software (OJS)
- Hosted by U of G Library

<http://davinci.lib.uoguelph.ca>

- Full, online journal functionality, including double-blind peer review & document mgt

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Vol 2 (2010)

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How Nanoscience Allows for Iridescence in Nature

Josh Fisher

First-Year Student (B.Sc. Nanoscience)

College of Physical and Engineering Science, University of Guelph, CANADA

Butterflies of the genus *Morpho* have brilliant blue wings that are both aesthetically pleasing and function as a defence mechanism; to accomplish this, these butterflies harness nanoscience and an optical phenomenon known as iridescence. Iridescence is an example of structural colour that is produced by the interaction of the physical structure of the surface with light. In 1704, Sir Isaac Newton published his book *Opticks*, in which he hypothesized about how organisms in nature, such as peacocks exhibited iridescence (Vukusic & Sambles, 1998; Kinoshita, Yoshioka, & Miyazaki, 2008). Now, hundreds of years later, nanoscience enables an in-depth understanding of how such optical phenomena occur. Specifically, through studying butterflies belonging to the genus *Morpho*, one is able to investigate the nanotopography of wings to determine how thousands of intricate nanoscale structures function to give *Morphos* the

resulting in an even brighter colour since they are in phase with each other. The shade of iridescence changes depending upon one's orientation with respect to the light scattering surface. This phenomenon is also explained by Bragg's Law of Diffraction, which is "expressed as: $n\lambda = 2d \sin\theta$ where n (an integer) is the "order" of reflection, λ is the wavelength of the incident [light], d is the interplanar spacing of the crystal and θ is the angle of incidence." (O'Neill, 2009). When Bragg's law is satisfied at a certain angle, constructive interference in light of a particular wavelength occurs. Therefore, since iridescence depends upon the constructive interference of light, depending upon variables including one's angle of view, iridescence of a particular light wavelength (colour of light) can occur. In nature, a species must possess specialized nanostructures in order for iridescence to occur.

Process (During Semester)



- **Students** define own topic
 - approved by faculty
- Research, write and submit manuscript
- Participate in double-blind, **peer review** process (also reviewed by three instructors)
- **Edit** their own papers as per reviews and resubmit to journal (grading)

In Following Semester



- Successful authors meet with **Science Writing Consultant** to improve manuscripts (1-2 hr/student)
 - Writing Services expert
- **Final review**
 - Editorial Advisor and Editor-In-Chief
- **Papers published**

Intentional Support for Learning

2. Just-in-Time Workshops (4 hrs)



- **Strategic literature searching**
 - Tools, strategies, evaluation of sources
- **Critical reading of scientific papers**
 - “Anatomy” of a journal article
 - Approaches to review if $t = 5, 30, 60-120$ min.
- **Features of good academic writing**
- **Effective peer review**
 - Evaluative criteria, content and expression

3. Assessment Rubrics



- Tailored to needs of course and preferences of instructors
- Define performance that is below, meets, and exceeds expectations
- *Two rubrics:*
 1. *Peer review*
 2. *Students' final manuscript*

Peer Review Rubric (7.5%)

| Dimension / Performance | Exemplary 100% | Accomplished 70% | Beginning 0% | Score |
|---|---|---|---|-------------|
| | Exceeds Expectations | Meets Expectations | Does not meet Minimum Requirements | |
| # Reviews | Reviewer submitted three reviews | n/a | Reviewer submitted fewer than 3 reviews | /1.5 |
| Content of Review | | | | |
| Strengths Weaknesses Errors | Identifies at least one major strength, one weakness and error (if present) <i>and</i> provides specific, constructive feedback on how to improve and/or correct the manuscript | Identifies at least one major strength, one weakness and error (if present) in the manuscript | Fails to identify one strength, one weakness AND one error in the manuscript | /3 |
| Communication of Ideas in Review | | | | |
| Clarity Organization Respect | Comments expressed in clear, precise language; review concise, logically organized and concise; language and tone consistently respectful | Key points understandable; review logically organized; word choice and phrasing demonstrate sensitivity to author of manuscript | Review unclear, poorly organized and/or uses harsh or careless language, tone | /3 |
| TOTAL | | | | /7.5 |

Adapted from *Journal of Library Administration* 50:396, 2010

Writing Rubric Dimensions



Content & Expression

- Topic & length
- Organization
- Argumentation
- Use of English
- Academic writing

= 15%

Citing & Referencing

- Sources
 - Number & type
 - Quality
- Citation
 - Each source cited
 - Style used correctly

= 7.5%

CONTENT & EXPRESSION (15)

| Dimension / Performance | Exemplary 3 Exceeds Expectations | ← → | Beginning 0 Does not meet Minimum Requirements | Score |
|----------------------------------|---|------------|---|--------------|
| Topic & Length | | | | |
| Definition | Topic clearly defined, narrow enough for article of this length | ← → | Topic poorly defined and/or too broad for article of this length | |
| Completeness | Paper includes informative discussion of context and significance | ← → | Superficial handling of context and/or significance | |
| Length of paper | Paper within (or just slightly over) 1,500-word limit (excluding references) | ← → | paper well exceeds 1,500-word limit falls below 1,200 words (excluding references) | /3 |
| Organization | Organized in a logical, easy-to-follow sequence, from introduction, step-by-step through body, to clear summary, conclusion | ← → | Disorganized; lacking introduction and/or conclusion; sequencing within body not obvious and/or illogical | /3 |
| Argumentation | Clear, focused, well-articulated, evidence-based; science is accurate and correctly explained | ← → | Fails to stay on topic; main points unclear; science incorrectly explained; lacks appropriate evidence | /3 |
| Use of English | <u>Rare</u> errors in spelling, grammar, punctuation; accurate and appropriate use of terms; smooth transitions between ideas | ← → | Frequent errors in spelling, grammar, punctuation; inaccurate and/or inappropriate use of terms (e.g., jargon, colloquialisms) | /3 |
| In Academic Writing Style | Objective; <u>concise</u> in making points; important scientific terms/concepts defined properly and used <u>precisely</u> | ← → | Informal writing style (e.g. uses personal pronoun, many contractions, slang), and/or fails to define important scientific terms/concepts; and/or expresses opinion rather than presents evidence | /3 |
| TOTAL | | | | /15 |

Adapted from *Journal of Library Administration* 50:393, 2010

CITING & REFERENCING (7.5)

| Dimension / Performance | Exemplary 100% | Accomplished 70% | Beginning 0% | Score |
|--------------------------|--|---|---|-------------|
| | Exceeds Expectations | Meets Expectations | Does Not Meet Minimum Requirements | |
| Number & Type of Sources | Uses <u>more than four</u> sources including one book, one review article, and one appropriate website | Uses four sources including one book, one review article, and one appropriate website | Uses fewer than four sources OR lists four but is missing one or more of the required types | /2 |
| Quality of Sources | All sources are of <u>high quality</u> (e.g. current, accurate, authoritative) AND <u>appropriate</u> to the topic | All sources are reliable and appropriate to the topic | One or more sources are of questionable quality and/or are unrelated to the topic | /3 |
| | 100% Meets Expectations | | 0% Does Not Meet Requirements | |
| Citation | Each source cited at least once within the body of the paper | <u>n/a</u> | Not all sources are cited within the body of the paper | /1 |
| Style | Citing & referencing conforms to <i>APA</i> style throughout | <u>n/a</u> | Citing & referencing does not conform to <i>APA</i> style OR uses it inconsistently | /1.5 |
| TOTAL | | | | /7.5 |

Adapted from *Journal of Library Administration* 50:394, 2010

Students' Comments



“My first experience in reading primary literature – I feel comfortable in reading it now.”

Grant Walters

“The feedback, especially from the science writing consultant, was enormously helpful. I felt as though we were being held to very high standards for 1st year writers, and I really enjoyed that.”

Edward Kim

Students' Comments



“I have nothing but good things to say about the e-journal project...I learned a lot about how to effectively search for information; especially how to sift through vast amounts of detailed information and pull out the key points...The skills learned and knowledge gained from the entire process have been very helpful to me in many of the classes that I have taken since.”

Joshua Fisher

Possible in YOUR Context?

Requirements

- Subject experts
- Information specialists
- Software
- Technology support
- Writing, learning and instructional dev't support

Resources

- ✓ Faculty
- ✓ Librarians
- ✓ OJS* is free
- ✓ Digital librarians
- CCS support
- ?

*Open Journal Systems: <http://pkp.sfu.ca/?q=ojs>

Questions & Contact



PEGGY A. PRITCHARD

Learning & Curriculum Support Librarian

McLaughlin Library 279

University of Guelph

Guelph, ON, N1G 2W1

(519) 824-4120 x 54626

ppritchard@uoguelph.ca

"The Embedded Science Librarian: Partner in Curriculum Design & Delivery"
Journal of Library Administration 50:373-396, 2010.

<http://pkp.sfu.ca/?q=ojs> ♦ <http://davinci.lib.uoguelph.ca>

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