

Application of
The Theory of Multiple Intelligences
to the
LEARNING OF CHEMISTRY

Gloria A. Brown Wright, J. J. Lagowski
The Department of Chemistry and Biochemistry
The University of Texas, Austin

Chemical Education Group Meeting
October 25 , 2002

HOWARD GARDNER

- neuropsychologist, researcher
- Theory of Multiple Intelligences (1983)
- Pilot Project – Summer, 2002

THE MULTIPLE INTELLIGENCES

existentialist <ul style="list-style-type: none">• <i>meaning and purpose</i>	inter-personal <ul style="list-style-type: none">• <i>interaction with others</i>	intra-personal <ul style="list-style-type: none">• <i>in touch with inner thoughts</i>
kinesthetic <ul style="list-style-type: none">• <i>activities, movement</i>	linguistic <ul style="list-style-type: none">• <i>words – oral, written</i>	logical-mathematical <ul style="list-style-type: none">• <i>reasoning, numbers</i>
musical <ul style="list-style-type: none">• <i>tunes, tones, rhythm</i>	naturalist <ul style="list-style-type: none">• <i>outdoors, environment</i>	spatial <ul style="list-style-type: none">• <i>orientation, shape</i>

GARDNER:

*For the PHYSICAL SCIENCES the
LEARNER needs*

- **linguistic**
- **logical-mathematical**
- **spatial**

intelligences

Population:
students enrolled in
first semester
college chemistry

PROTOCOL:

(3 GROUPS OF SUBJECTS)

- **IDENTICAL PRE-QUIZZES**
- **ONE OF 3 TUTORIAL VERSIONS**
- **IDENTICAL POST-QUIZZES**

TOPICS:

- **CHEMICAL BONDING**
- **GAS LAWS**

CONCERNS

1. All three versions

- equivalent presentations
- appropriate length
- appropriate level
- inclusiveness

CONCERNS

2. Pre- and post-quizzes

- equally representative
- representative of lessons
- require thinking about the concepts

CONCERNS

3. Student should

- make serious effort to learn
- continue in project
- find it necessary to think about the concepts

RESULTS

Sample sizes:

- chemical bonding – 9
(3 each intelligence)
- gas laws – 21
(7 each intelligence)

RESULTS

(observations)

- Average time taken minutes):
 - Prequiz – 7 (CB); 9 (GL);
 - Tutorial – 25 (CB); 15 (GL);
 - Postquiz – 9 (CB); 8 (GL);
- Attitudes: mostly serious

RESULTS

(Average pre- → postquiz scores)

Intelligence	Chemical bonding (30 points maximum)	Gas laws (30 points maximum)
linguistic	12 → 14 (+2)	12 → 18 (+6)
spatial	12 → 14 (+2)	12 → 15 (+3)
logical- mathematical	8 → 18 (+10)	9 → 18 (+9)

SUMMARY

- all groups improved
- linguistic and spatial groups similar, higher than logical-mathematical
- greatest gain from logical-mathematical for both concepts

CONCLUSION

- for these topics students responded best to logical-mathematical approach
- experiment currently being repeated with larger numbers

SOME REFERENCES

Gardner, Howard Frames of Mind: The Theory of Multiple Intelligences Basic Books, Inc. N.Y., 1983.

Gardner, Howard Multiple Intelligences: The Theory In Practice Basic Books, Inc. N.Y., 1993.

Campbell, Linda; Campbell, Bruce Multiple Intelligence and Student Achievement: Success Stories From Six Schools Association for Supervision and Curriculum Development, Alexandria, VA 1999.

Sweet, Sharon *Educational Leadership* **1998** 56 50.

Jones and Berger *J. Educational Multimedia and Hypermedia* 1995 4 305.

<http://surfaquarium.com/im.htm>

www.MIResearch.org.

ACKNOWLEDGEMENTS

CH 301 students, Summer 2002

Greg Felton, ICS Instructor, Summer
2002

Stacy Sparks, Lecturer, Department of
Chemistry and Biochemistry,
The University of Texas, Austin, TX