

Dr. Grant Williams

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Education

Ed.D. **University of Massachusetts Amherst**
2011 Mathematics, Science, and Learning Technologies

Doctoral Dissertation: *Fostering High School Physics Students' Construction of Explanatory Mental Models for Electricity: Identifying and Describing Whole Class Discussion Based Teaching Strategies.* Supervisor: Dr. John J. Clement

M.Ed. **University of New Brunswick**
1995 Educational Administration

B.Ed. **University of New Brunswick**
1990 Secondary Science Education

B.Sc. **Mount Allison University**
1988 Physics & Mathematics

Professional Experience

Associate Professor – Science and Math Education Aug. 2015 – Present

School of Education, St. Thomas University, Fredericton, NB, Canada

- Teaching undergraduate and graduate courses in science and math education
- Conducting research on science and math teaching and learning

Director July 2016 – Dec. 2018

School of Education, St. Thomas University, Fredericton, NB, Canada

- Directed daily operation of faculty, staff, and students
- Developed partnerships with local school districts, provincial Department of Education, other university B.Ed. programs, and the NBTA
- Liaised with university senior administration and other faculties
- Provided leadership of visioning processes
- Created and managed operating budget

Assistant Professor – Science and Math Education

Aug. 2011 – June 2015

School of Education, St. Thomas University, Fredericton, NB, Canada

- Taught undergraduate and graduate courses in science and math education, assessment practices, classroom management, and project-based learning.
- Supervised teacher candidates during field placements
- Conducted research on science and math teaching and learning

Learning Specialist – K-12 Science & Math

Aug. 2006 – May 2011

School District 18, Fredericton, NB, Canada

- Provided leadership in Science & Math professional development initiatives
- Coordinated the assessment and selection of instructional curricula, programs, supplementary materials, field tests, etc.
- Coordinated and monitored District and Provincial-level student evaluations in Science and Mathematics.

Research Assistant

Sept. 2004 – Aug 2006

Scientific Reasoning Research Institute, University of Massachusetts Amherst, MA, USA

- Collected & analyzed qualitative and quantitative classroom data
- Submitted papers and presented talks at major conferences

Faculty Associate

Jan. 2003 – June 2004

Faculty of Education, University of New Brunswick, Fredericton, NB, Canada

- Taught elementary & secondary science methods courses
- Supervised student interns during practice teaching experiences

High School Physics Teacher

Sept. 1996 – Dec. 2002

Fredericton High School, Fredericton, NB, Canada

- Instructed courses in Physics 11 & 12 (Academic and AP) and Science 9 & 10
- Served as Faculty Advisor for Student Government, Robotic Team and Reach for the Top Trivia Team

Middle School Science Teacher

Sept. 1990 – June 1996

George Street Middle School, Fredericton, NB, Canada

- Instructed grade 7, 8, & 9 Science, Physical Education., and Language Arts
- Served as Faculty Advisor for Student Council
- Coached Junior Varsity Boys Basketball, Soccer, & Volleyball

Teaching Certification

- Level 6 Teaching Certificate in the province of New Brunswick (1990)
- New Brunswick Principal's Certificate (1997)

Academic Scholarships & Awards

- 2018 John McKendy Memorial Teaching Award – St. Thomas University
- 2005 NSF Research Assistantship at the University of Massachusetts Amherst
- 2004 NSF Research Assistantship at the University of Massachusetts Amherst
- 2004 Johnson Insurance Ltd. Academic Grant for Graduate Study
- 2004 New Brunswick Teachers' Association Credit Union Scholarship
- 2003 Finalist - Allan P. Stuart Award for Excellence in Teaching at UNB
- 1989 Otty L. Barbour Scholarship at University of New Brunswick
- 1989 Viscount R.B. Bennett Prize in Education at University of New Brunswick
- 1985 Sharp Entrance Scholarship to Mount Allison University

Refereed Chapters

Williams, G.; Leger, M.; Sherman, A.; & Ferguson, N. (2019). New Brunswick: Science education in Canada's only bilingual province. In C. Tippett & T. Milford (Eds.) *Science Education in Canada*, Springer.

Williams, G. & Clement, J. (2019). Co-constructing models through whole class discussions in high school physics. In D. Sunal, J. Shemwell, J. Harrell & C. Sunal (Eds.) *Physics Teaching and Learning: Challenging the Paradigm - Research in Science Education Series*. Charlotte, NC: Information Age Publishing.

Refereed Journal Articles

Williams, G., Clement, J., & Pham, D. (under review). Model-Based Science Teaching: Effects on Comprehension, Confidence Levels, and Attitudes of High School Physics Students. *Canadian Journal of Science, Mathematics, and Technology Education*, Springer.

Williams, G.; Oulton, R.; & Taylor, L. (2017). Constructing Scientific Models Through Kinulations. *Science Scope*. Vol. 41 No. 4, pp 64-72. NSTA Publications.

Williams, G. & Clement, J. (2015). Identifying multiple levels of discussion-based teaching strategies for constructing scientific models. *International Journal of Science Education*. 37(1): 82-107.

Williams, G. (2014). Using peer and self-assessment to foster the development of pre-service teachers' presentation skills. Association of Atlantic Universities. (2013). *Proceedings of the 2013 AAU Teaching Showcase*, pp. 143-158. Sackville, N.B.

Williams, G. (2013). Facilitating effective whole class discussions: Strategies for science educators. Association of Atlantic Universities. (2012). *Proceedings of the 2012 AAU Teaching Showcase*, pp. 81-89. Fredericton, NB.

Williams, E.G. & Clement, J. (2007). Strategy levels for guiding discussion to promote explanatory model construction in circuit electricity. In L. McCullough, L. Hsu, & P. Heron (Eds.) *2006 Physics Education Research Conference, AIP Conference Proceedings, Vol. 883* (pp. 169-172). Melville, NY: American Institute of Physics.

Conference Presentations

Williams, G.; Hanenberg, E.; & Stewart, K. (2020). *The House That STEM Built: Science, Technology, Engineering & Math in the Building/ Construction Trades*. Presentation at the Canadian Society for the Study of Education Annual Conference, London, ON, May 2020 (conference cancelled).

Williams, G.; Clement, J.; & Pham, D. (2020). *Model-Based Science Teaching: Effects on Confidence, Interest, and Attitudes of Female High School Students*. Presentation at the National Association of Research in Science Teaching Annual International Conference, Portland, OR, March 2020 (conference cancelled).

Williams, G.; Hanenberg, E.; & Stewart, K. (2020). *The House That STEM Built: Science, Technology, Engineering & Math in the Building/ Construction Trades*. Presentation at the National Association of Research in Science Teaching Annual International Conference, Portland, OR, March 2020 (conference cancelled).

Williams, G. (2019). *The House That STEM Built: Highlighting the Science, Technology, Engineering and Mathematics in the Building and Construction Trades*. New Brunswick Education Research Symposium, University of New Brunswick, Fredericton, NB, April 2019.

Williams, G. (2018). *Minds-On, Bodies-In Learning: Constructing Scientific Models with Kinulations*. New Brunswick Education Research Symposium, St. Thomas University, Fredericton, NB, April 2018.

Williams, G.; Oulton, R.; & Taylor, L. (2017). *Kinesthetic Simulations: Model-Based Teaching and Learning in Science*. Canadian Society for the Study of Education Annual Conference, Toronto, ON, May 2017.

Williams, G. & Clement, J. (2017). *Model-Based Science Teaching: Changes in Confidence Levels and Attitudes of Female High School Students*. AERA 2017 Annual Conference, San Antonio, TX, United States, April 2017.

Williams, G. & Clement, J. (2017). *The Influence of Model-Based Science Teaching on Female High School Students' Attitudes and Confidence Levels*. NARST 2017 Annual International Meeting, San Antonio, TX, United States, April 2017.

Williams, G. & Clement, J. (2017). *Co-Constructing Models in High School Physics: Comparing Degrees of Teacher and Student Participation in Whole Class Discussions*. NARST 2017 Annual International Meeting, San Antonio, TX, United States, April 2017.

Williams, G.; Oulton, R.; & Taylor, L. (2016). *Utilizing Cognitive Model Construction Strategies to Support Students' Participation in Kinesthetic Simulations*. NARST 2016 Annual International Meeting, Baltimore, MD, United States, April 2016.

Williams, G. & Clement, J. (2016). *Influencing Pre-Service Science Teachers' Beliefs About Model-Based Whole-Class Discussions*. NARST 2016 Annual International Meeting, Baltimore, MD, United States, April 2016.

Williams, G. (2015). *Let's Kinulate That! Fostering Understanding of Science Concepts through Kinesthetic Simulations*. Humanities Education and Research Association Annual Conference, San Francisco, CA, United States, April 2015.

Williams, G. (2014). *Kinulations: Fostering K-12 Students' Understanding of Science Concepts through Participation in Kinesthetic Simulations (Keynote Address)*. University of Maine - RiSE (Research in STEM Education) Center Colloquium, Orono, ME, United States, Nov. 2014.

Williams, G. & Clement, J. (2014). *Using Research on Cognitive Discussion Strategies to Support Pre-Service Science Teachers' Model-Based Teaching Skills*. 2014 NARST Annual International Conference, Pittsburgh, PA, United States, April 2014.

Williams, G. (2013). *Using Peer and Self-Assessment to Foster the Development of Pre-Service Teachers' Presentation Skills*. 2013 AAU Teaching Showcase, Sackville, NB, Canada, Oct. 2013.

Clement, J. & Williams, G. (2013). *Comparing Expert Learning Processes to Those That Exemplary Teachers Foster in Whole Class Discussions*. European Science Education Research Association Conference, Nicosia, Cyprus, Sept. 2013.

Williams, G. & Clement, J. (2013). *From Research to Practice: Fostering Pre-Service Science Teachers' Skills in Facilitating Effective Whole Class Discussions*. 2013 NARST Annual International Conference, Rio Grande, Puerto Rico, April 2013.

Clement, J. & Williams, G. (2013). *Parallel Roles of Non-Formal Reasoning in Expert Scientific Model Construction and Classroom Discussions in Science*. 2013 NARST Annual International Conference Rio Grande, Puerto Rico, April 2013.

Williams, G. (2012). *Supporting Students' Conceptual Change in Physics: Utilizing Teaching Strategies from the OGEM Cycle*. 2012 NARST Annual International Conference, Indianapolis, IN, United States, March 2012.

Williams, G. (2012). *Facilitating Effective Whole Class Discussions: Strategies for Science Educators*. 2012 AAU Teaching Showcase, Fredericton, NB, Canada, Oct. 2012.

Williams, G. & Clement, J. (2011). *Multiple Levels of Discussion-Based Teaching Strategies for Supporting Students' Construction of Mental Models*. 2011 NARST Annual International Conference, Orlando, FL, United States, April 2011.

Williams, G. & Clement, J. (2010). *Supporting Students' Construction of Mental Models for Electric Circuits: An Investigation of Teacher Moves Used in Whole Class Discussions*. 2010 NARST Annual International Conference, Philadelphia, PA, United States, March 2010.

Williams, G. & Clement, J. (2009). *Model Co-Construction in High School Physics: A Case Study of Teachers' Intended Instructional Pathways and Recovery Routes*. 2009 NARST Annual International Conference, Garden Grove, CA, United States, April 2009.

Williams, G. (2008). *Gender Inequities in Science Education: What You Can Do to Close the Gap in Learning Opportunities* – ACASE Annual Conference, Saint Mary's University, Halifax, NS, Canada, July 2008.

Williams, G. & Clement, J. (2008). *Co-Constructing Explanatory Mental Models in High School Physics: Comparing Ratios of Teacher/ Student Participation*. 2008 NARST Annual Meeting – Baltimore, MD, United States, April 2008.

Williams, G. (2008). *A Comparative Case Study of Two CASTLE Teachers: Fostering Students' Construction of Explanatory Mental Models for Electric Circuits*. An invited paper presentation at the AAPT Winter Meeting, Baltimore, MD, United States, Jan. 2008.

Williams, G. (2007). *An Introduction to Model-Based Instruction in Science*. ACASE Annual Conference, Memorial University of Newfoundland, St. John's, NF, Canada, July 2007.

Williams, G. & Clement, J. (2007). *Identifying Model-Based Teaching Strategies: A Case Study of Two High School Physics Teachers*. 2007 NARST Annual International Conference, New Orleans, LA, United States, April 2007.

Williams, G. (2007). Pursuing Shared Goals through Differing Strategies: Comparing the Model-Based Teaching Moves of Two High School Physics Teachers. 2007 AERA Conference, Chicago, IL, United States, April 2007.

Williams, G. & Clement, J. (2006). *Strategy levels for guiding discussion to promote explanatory model construction in circuit electricity*. Physics Education Research Annual Conference, Syracuse, New York, United States, July 2006.

Williams, G. & Clement, J. (2006). *Model-based Teaching of Electricity: Improving Student Reasoning and Confidence*. AAPT Annual Conference, Syracuse, NY, United States, July 2006.

Williams, G. (2006). *A Comparison of the Whole-Class Discussion-Based Teaching Strategies of Two Physics Teachers Utilizing the Same Model-Based Curriculum*. ACASE Annual Conference, UNB, Fredericton, NB, Canada, July 2006.

Williams, G. (2006). *The Volunteer Experiences of Senior Citizen Interpreters at a Science Museum: A Fountain of Youth and a Foundation for our Future*. 2006 NARST Annual International Conference, San Francisco, CA, United States, April 2006.

Williams, G. & Clement, J. (2006). *The Effects of Model-Based Learning of Concepts in Electricity on Students' Reasoning Strategies, Confidence, and Attitudes in science*. 2006 NARST Annual International Conference, San Francisco, CA, United States, April 2006.

Williams, G. & Clement, J. (2006). *Teacher Moves During Large-Group Discussions of Electricity Concepts: Identifying Supports for Model-Based Learning*. 2006 NARST Annual International Conference, San Francisco, CA, United States, April 2006.

Williams, G. & Clement, J. (2006). *Model-Based Learning of Concepts in Electricity: Effects on Students' Reasoning Strategies, Confidence, and Attitudes in Science*. 2006 AERA Conference, San Francisco, CA, United States, April 2006.

Williams, G. (2006). *What the Volunteer Experience Means to Senior Citizen Science Museum Exhibit Interpreters*. ASTE Northeast Conference, Amherst, MA, United States, Oct. 2005

Williams, G. (2005). *Identifying Teacher Moves that Support Model-Based Learning of Concepts in Electricity through an Analysis of Student-Teacher Discourse*. ACASE Annual Conference, St. Francis Xavier University, Antigonish, NS, Canada, July 2005.

Professional Development Workshops Facilitated

Williams, G. (2016). *Using Predictive and Explanatory Drawings to Support Student Reasoning in Physics*. Atlantic Physics Teaching Day - University of New Brunswick, Saint John, NB, Canada, Oct. 2016.

Williams, G. (2015). *Fostering Students' Scientific Thinking and Skills Through the Grade 10 Motion Unit*. New Brunswick Anglophone North School District Science Teachers' PD Day, Miramichi, NB, Canada, Nov. 2015.

Williams, G. (2015). *Physics Kinulations: Engaging Students in Kinesthetic Simulations of Abstract Concepts*. Atlantic Physics Teaching Day - University of New Brunswick, Fredericton, NB, Canada, May 2015.

Williams, G. (2014). *The Science Selfie Project: Using Video Recordings of Your Science Teaching as Reflective Practice*. New Brunswick Anglophone North School District Science Teachers' PD Day, Miramichi, NB, Canada, Feb. 2015.

Williams, G. (2014). *We Are Teachers and We Are a Thing! (Keynote Address)*. Anglophone North School District - Teacher PD Start Up Day, Bathurst, NB, Canada, Aug. 2014.

Williams, G. (2014). *The Next Generation Science Standards: Developing Practices, Concepts, and Core Ideas*. New Brunswick Anglophone North School District Professional Development Days, Bathurst, NB, Canada, Aug. 2014.

Williams, G. (2011). *Helping your Students Understand Abstract Concepts in Science Through Active Analogies*. - NBTA Elementary Council PD Day, Fredericton, NB, Canada, May 2011.

Journal Review Activities

Proceedings of the 2013 AAU Teaching Showcase Dec. 2013 – Feb. 2014
Number of Works Reviewed / Refereed: 1

Proceedings of the 2012 AAU Teaching Showcase Nov. 2012 – Feb. 2013
Number of Works Reviewed / Refereed: 2

Research Funding History

Principal Investigator Jan 2020 – March 2020

The House That STEM Built: Harrison McCain Student Research Internship Grant
Total Funding - \$1,500

Principal Investigator May 2019 – April 2020

The House That STEM Built: New Brunswick Innovation Foundation Research Assistantship Grant
Total Funding - \$6,000

Collaborator Aug. 2015 – July 2017

Strategies for Leading Classroom Discussions Aimed at Core Ideas and Scientific Modeling Practices. National Science Foundation (USA) DRK-12
Total Funding - \$14,500
Principal Investigator: Dr. John Clement

Principal Investigator May 2015 – April 2016

Kinulations: Fostering Students' Participation in Kinesthetic Simulations of Abstract Concepts in Science. New Brunswick Innovation Foundation Research Assistantship Grant
Total Funding - \$5,000

Principal Investigator April 2015 – March 2016

Kinulations: Fostering Students' Participation in Kinesthetic Simulations of Abstract Concepts in Science. St. Thomas University Office of Research Services Research Assistantship Grant
Total Funding - \$2,000

Principal Investigator Oct. 2014 – Oct. 2015

Kinulations: Fostering Students' Participation in Kinesthetic Simulations of Abstract Concepts in Science. St. Thomas University Senate Research Committee Research Assistantship Grant
Total Funding - \$500

Principal Investigator Jan. 2014 – Jan. 2015

Kinulations: Fostering Students' Participation in Kinesthetic Simulations of Abstract Concepts in Science. St. Thomas University Senate Research Committee Major Research Grant
Total Funding - \$4,500

Collaborator Sept. 2012 – Aug. 2014

Identifying Science Teaching Strategies for Promoting Reasoned Discussions of Concepts and Simulations. National Science Foundation (USA) DRK-12
Total Funding - \$25,492
Principal Investigator: Dr. John Clement

Principal Investigator Sept. 2013 – Dec. 2013

Identifying Science Teaching Strategies for Promoting Reasoned Discussions of Concepts and Simulations. St. Thomas University Office of Research Services Research Assistantship Grant
Total Funding - \$500

Principal Investigator April 2012 – Aug. 2013

Identifying Science Teaching Strategies for Promoting Reasoned Discussions of Concepts and Simulations. New Brunswick Innovation Foundation Research Assistantship Grant
Total Funding - \$5,000

Academic service within St. Thomas University

Member – Pension Advisory Committee	2020 -
Vice Chair - Joint Board Senate Committee on the Growth and Future of STU	2017 - 2020
Member - Professor Emeritus Committee	2017 - 2020
Chair - Board of Inquiry - Research Ethics Investigation	2017
Director – School of Education	2016 - 2018
Senator – University Senate	2016 - 2018
Member - Advancement & Alumni Relations Working Group	2014 - 2016
Chair - Hiring Committee - Endowed Chair in Native Studies	2015
Faculty Host for Visiting Scholar from Chile	2013
Member - Senate Research Committee	2012 -2015
Member – Committee for Appointments, Promotion & Tenure	2012-13

Course Development

EDUC 536 - Program Development (Graduate course) - St. Francis Xavier Univ. – July 2019
EDUC 6153 – Assessment as an Instructional Practice (Graduate Course) – July 2018
EDUC 6633 - Teaching Elementary & Middle Level Mathematics (Graduate course) - July 2014
EDUC-5833 - Teaching Secondary Math & Science - Jan. 2014
EDUC-6733 - Teaching Elementary and Middle Level Science (Graduate course) – July 2013
EDUC-5723 - Contemporary Science Concepts for Elementary Educators – July 2012
EDUC-5873 - Teaching Middle Level and Secondary Math – Sept. 2011
EDUC-5863 - Methods in Middle & Secondary Science Education – Sept. 2011

Graduate Student Supervision

M.Ed. Thesis Reviewer and Oral Exam Member July 2018 – Sept 2018

Geoff MacDonald - Faculty of Education, University of New Brunswick, Fredericton, NB

PhD Academic Advisor and Oral Exam Member July 2013 – Sept. 2014

Samuel Aboagye – Faculty of Education, University of New Brunswick, Fredericton, NB

Event Administration

Organizer/ Facilitator May 2018

ACDE Panel “Preparing Educators for Teaching Beyond the Canadian K-12 Sector” at the 2018 Annual CSSE Conference - Regina, SK

Co-Chair April 2018

New Brunswick Education Research Symposium – hosted at St. Thomas University

Event Creator/ Chair Sept. 2006 – July 2011

School District *STEM EXPO* (Science, Technology, Engineering, and Mathematics) for K-12 Students

Conference Co-Chair April 2009

SMArts Conference - Linking Science, Math and the Arts (NSERC Funded Event)

Community and Volunteer Activities

Honorary Research Associate – University of New Brunswick	2017 - present
Secretary - Board of Directors - Science East Fredericton, NB, Canada	2016 - present
Judge - Canada Wide Science Fair Fredericton, NB, Canada	2015 & 2019
Judge – New Brunswick Provincial Science Fair	2008 - present
Judge - High School Math Fair, Central New Brunswick Academy	2010 - 2018
Judge - Middle School Science Fair, Bliss Carman Middle School	2012 - 2017
Judge - Middle School Science Fair, Nashwaaksis Middle School	2013 - 2017

Professional Affiliations

NARST - National Association for Research in Science Teaching
AERA - American Educational Research Association
NSTA - National Science Teachers' Association
NCTM - National Council of Teachers of Mathematics
NBTA - New Brunswick Teachers' Association
ACDE - Association of Canadian Deans of Education
CSSE - Canadian Society for the Study of Education
CACS - Canadian Association for Curriculum Studies
SERG - Science Education Research Group
UNBPERSIG – UNB Physics Education Research Special Interest Group