

Curriculum Vitae

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Education Background

- Ph. D., Curriculum and Instruction, University of British Columbia, 1993
 Specialization: Science Education
 Minor: Computer Studies Education
 Dissertation: Robustness redressed: An exploratory study of the relationship among overall assumption violation, model-data fit, and invariance properties for Item Response Theory models (advisor: Dr. David Bateson)
- M. Ed., Chemical Education, East China Normal University, 1986
 Thesis: A quantitative study of chemistry teachers' selection processes of teaching methods (advisor: Prof. Jiaying Li)
- Diploma, Secondary School Chemistry Teaching, Wuhan Teachers College at Xiaogan (currently Hubei Engineering College), 1981

Academic Appointment

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| Aug. 2002 – Present | State University of New York at Buffalo, USA
SUNY Distinguished Professor (2023), Professor (2010), Associate Professor with tenure (2003) |
| Sept. 2020 – Aug. 2022 | Program Director, Division of Research on Learning in Formal and Informal Settings (DRL), Directorate of Education and Human Resources, National Science Foundation |
| Aug. 1998 – July 2002 | University of Prince Edward Island, Canada
Associate Professor (tenured 1999) |
| Aug. 1992 – July 1998 | St. Francis Xavier University, Canada
Associate Professor (tenured 1998), Assistant Professor, Lecturer |
| July 1986 – June 1989 | Chinese National Institute for Educational Research (Currently Chinese Academy of Education), China
Research Associate |
| Sept. 1981- Aug. 1983 | Yunmeng No. 2 Secondary School, Hubei, China
Chemistry Teacher |

Honors and Awards

Fellow, American Association for the Advancement of Science (AAAS), 2020
 Exceptional Scholars Sustained Achievement Award, University at Buffalo, State University of New York, 2018
 Distinguished Achievement Award for Excellence in Publishing, 2010
 Recognition for the book edited by J. Gess-Newsome, J. Luft, and R. Bell (2008).
Reforming secondary science instruction. Arlington, VA: NSTA Press. (Liu, X., Zawick, J., & Arnold, Chapter 7 Using data to reform science instruction, pp. 77-89).
 Fellow, Center for Inquiry Transnational, 2008
 Guest Professor, Shaanxi Normal University, P. R. China, 2018 - 2020
 Guest Professor, Northeast Normal University, P. R. China, 2018 - 2020
 Guest Professor, Beijing Normal University, P. R. China, 2007 - 2020
 Guest Professor, Shandong Normal University, P. R. China, 2018 - 2020
 Guest Professor, Guangxi Normal University, P. R. China, 1998 - 2004
 Research Award based on publication and external grants, St. Francis Xavier University, 1994 - 1998
 University Graduate Fellowship, University of British Columbia, Canada, 1990 – 1992

National Academic Membership

National Association for Research in Science Teaching (NARST) – A Worldwide Organization for Improving Science Teaching and Learning through Research
 American Educational Research Association (AERA)
 American Association for the Advancement of Science (AAAS)

Visiting Experience

Beijing Normal University, P. R. China
 Assessment of Scientific Literacy. Sponsor: Prof. Lei Wang, Oct. 2018
 Beijing Normal University, P. R. China
 Science and the public. Sponsor: Prof. Xiao-ting Liu, Nov. 2008
 Graduate School of Education, Harvard University
 Genetic epistemology. Sponsor: Prof. Eleanor Duckworth, June 2002
 Faculty of Education, University of British Columbia
 TIMSS databases. Sponsor: Dr. David Robitaille, Nov. 2001
 Department of Chemistry, Guangxi Normal University, China
 Constructivist inquiry teaching and learning. Sponsor: Prof. Tang Li, Oct. 2001
 Faculty of Education, University of Calgary
 Central conceptual structures of energy. Sponsors: Drs. Bonnie Shapiro and Anne McKeough, Sept. 2001
 Ontario Institute for Studies in Education (OISE), University of Toronto
 Dual Scaling. Sponsor: Dr. Phil Nagy, May – August, 1994

Professional Leadership

2019 – Present	Co-Editor-in-Chief, <i>Disciplinary and Interdisciplinary Science Education Research</i>
2020 – Present	Associate Editor, <i>Journal of Research in Science Teaching</i>
2018 – Present	Editorial board member, <i>Journal of Research for STEM Education</i>

2004 – Present	Editorial board member, <i>Journal of Science Education and Technology</i>
2008 – Present	Editorial board member, <i>International Journal of Environmental & Science Education</i>
2011– Present	Editorial board member, <i>Research in Chemical Education</i> (Chinese)
2017– Present	Editorial board member, <i>Science Popularization Research</i> (Chinese), 2010-present
2021 – 2024	Member and co-chair, Selection Committee for the Distinguished Contribution to Research Award, NARST
2020 – 2022	Program Director, Division for Research in Formal and Informal Settings, Directorate of STEM Education, National Science Foundation
2017 – 2019	Associate Editor, <i>Eurasia Journal of Mathematics, Science and Technology Education</i>
2010 – 2015	Associate Editor, <i>Journal of Research in Science Teaching</i>
2008 – 2019	Editorial board member, <i>Science Education</i>
2010 – 2013	Elected Member, Board of Directors, NARST – A Worldwide Organization for Improving Science Teaching and Learning through Research
2007 – 2010	Editorial board member: <i>Journal of Research in Science Teaching</i>

Academic Leadership

July 2014 – Jan. 2018	Inaugural Director, Center for Educational Innovation, State University of New York at Buffalo
August 2013 – July 2014	Associate Dean for Interdisciplinary Research, Graduate School of Education, State University of New York at Buffalo
July 2010 – Dec. 2010	Interim Chair, Department of Learning and Instruction, State University of New York at Buffalo

External Funding

25. National Institute of Health, Jan. 1, 2020 – December 31, 2024, \$2,586,092, Co-I
Project: Mentored Career Development Award Linked to UL1T1001412-06 (Clinical and Translational Science Award) (PI: Margarita Dubocovich)
24. National Institute of Health, Jan. 1, 2020 – December 31, 2024, \$19,231,451, Director of Evaluation
Project: University at Buffalo Clinical and Translational Science Institute (PI: Tim Murphy)
23. US Department of Education, May 2019 – April 2024, \$2,695,451, Co-PI
Project: University at Buffalo Teacher Residency Program (PI: Suzanne Rosenblith)
22. National Science Foundation, June 1, 2017 – May 31, 2020, \$30,919, PI
Project: VTAB: Vertical Transfer's Access to the Baccalaureate in Engineering & Engineering Technology (subaward from RIT for conducting external evaluation)
21. National Science Foundation, Sept. 1, 2017 – Aug. 31, 2020, \$428,873, co-PI
Project: The NAVIGATE Project: A Case-Study Approach to Overcoming Barriers to Advancement for Women (PI: Liesl Folks)

20. National Institute of Health, March 1, 2017 – Dec. 31, 2022, \$2,363,646, co-I
Project: Initiative for Maximizing Student Development: Enabling Access to Cutting-Edge Biomedical and Behavioral Science (PI: Margarita Dubocovich)
19. National Science Foundation, Jan. 1, 2017 – Dec. 31, 2019, \$1,199,127, co-PI
Project: GTEST – Geotechnology Experience for Students and Teachers (PI: Joseph A. Gardella)
18. National Science Foundation, Oct. 1, 2016 – May 1, 2018, \$150,619, PI
Project: Collaborative Research: AGEP Transformation Alliance: CIRTL AGEP - Improved Academic Climate for STEM Dissertators and Postdocs to Increase Interest in Faculty Careers.
17. State University of New York Performance Improvement Fund, July 1, 2016 – June 30, 2019, \$250,000, co-PI
Project: Increasing Access, Completion and Seamless Transfer Success through the Development of Common Student Learning Outcomes, Diagnostic Assessment and Supportive Digital Teaching Resources for High Demand/High Impact Gateway Courses (PI: A. Scott Weber)
16. National Institute of Health, Aug. 12, 2015 – March 31, 2019, \$1,818,925, co-I
Project: Mentored Career Development Award Linked to UL1TR001412 (Clinical and Translational Science Award) (PI: Margarita Dubocovich)
15. National Institute of Health, March 28, 2012 – Feb. 28, 2017, \$2,095,000, co-I
Project: Enabling Access to Cutting-Edge Biomedical and Behavioral Science (PI: Margarita Dubocovich)
14. National Science Foundation, Sept. 1, 2011 – Aug. 31, 2016, \$9,800,000, co-PI
Project: University at Buffalo/Buffalo Public Schools Interdisciplinary Science and Engineering Partnership (PI: Joseph A. Gardella)
13. The National Science Foundation, Sept. 1, 2009 – Aug. 31, 2013, \$499,962, PI
Project: Connected Chemistry as Formative Assessment
12. The National Science Foundation, Jan. 1, 2009 – Dec. 31, 2010, \$149,981, co-PI
Project: CCLI: First Course in Nanoelectronics for Engineers (PI: Gottfried Strasser)
11. New York State Department of Education, May 1, - Oct. 31, 2008, \$100,984, PI
Project: Excelsior Scholars Program for Grade Seven Mathematics and Science Students: Investigating Mysteries in Science (IMS)
10. John Oishei Foundation, Sept. 2006 – Aug. 2008, \$480,000, co-PI
Project: Interdisciplinary Science Research-Based Curricular Innovations for Middle and High School Science and Teacher Professional Development (PI: Joseph A.

Gardella)

9. The National Science Foundation, March 2006 – Feb. 2008, \$179,000, co-PI
Project: Interdisciplinary Nanoelectronics Laboratory for the Engineering/Science Undergraduate Curriculum (PI: Vladimir Mitin)
8. The Spencer Foundation, Chicago, USA, March – Dec. 2003, \$34,952, PI
Project: Students' Conceptual Understanding of Matter: The Progression Pattern and Underlying Psychological Structure
7. The Social Sciences and Humanities Research Council of Canada (SSHRC), 2002 – 2006, Cdn\$58,000, PI
Project: Central Structures of Students' Conceptions in Science and Implications for Science Curriculum and Instruction
6. The Canada Foundation for Innovation (CFI), 2002, Cdn\$1,492,272.00, co-PI
Project: Institute for Interdisciplinary Research in Culture, Multimedia, Technology, and Cognition (CMTC) (Infrastructure fund) (PI: Anne Cohen)
5. The Social Sciences and Humanities Research Council of Canada (SSHRC), 1996-2000, Cdn\$79,680, PI
Project: The Validity and Reliability of Digraphs: Assessing Students' Conceptual Change in Structural Characteristics in Science
4. Ethnic Studies, Canadian Heritage, 1996 - 1997, Cdn\$6,000, PI
Project: Development of a WWW Multicultural Science Education Site on the Internet
3. Office of Learning Technology, Human Resources Development Canada, 1996 - 1997, Cdn\$65,800, co-PI
Project: Integration of Computers into the Curriculum: Stage 2 (PI: Vianne Timmons)
2. The Spencer Foundation, Chicago, USA, 1995 - 1996, \$12,000, PI
Project: Assessment of Students' Conceptual Change in Structural Characteristics in Science through Student Writings and Digraphs
1. National Labour Market Programs, Human Resources Development Canada, 1994 - 1995, Cdn\$12,000, co-PI
Project: Integration of Computers into the Curriculum: Stage 1 (PI: Vianne Timmons)

Publications (* Senior author co-authoring with students)

Special Journal Issue Guest-Editor Editorials

2. Liu, X., & Zhang, B. (2014) (eds.). Special Issue (SI): International Conference on Science Education (ICSE), Nanjing, China, Oct. 2012. *Journal of Science Education and Technology*, 23(2), 207-210.
1. Liu, X., Liang, L. L., & Liu, E. (2012) (eds.). Science education research in China:

Challenges and promises. A special issue of *the International Journal of Science Education*, 34(13), 1961-1970.

Refereed Books

14. Liu, X., & Boone, W. J. (eds.) (2023). *Advances in applications of Rasch measurement in science education*. Cham, Switzerland: Springer.
13. Liu, X., & Wang, L. (eds.) (2023). *Volume 11: The rise of STEM education*. A volume in R. Tierney, F. Rizvi, K. Ercikan and G. Smith (eds.), *International Encyclopedia of Education* (4th edition). Oxford, UK: Elsevier.
<https://www.elsevier.com/books/international-encyclopedia-of-education/tierney/978-0-12-818629-9>
12. Gorlewski, J., Winkelsas, A., Rosenblith, S., ...Liu, X., ... (2022). *A case for change in teacher preparation: Developing community-based residency programs*. New York: Routledge.
11. Liu, X. (2020). *Using and developing measurement instruments in science education: A Rasch Modeling approach (Second Edition)*. Charlotte, NC: Information Age Publishing.
10. Liu, X., & Wen M. (eds.) (2018). *Confucianism reconsidered: Insights for American and Chinese education in the 21st Century*. Albany, NY: SUNY Press.
9. Liang, L., Liu, X., & Fulmer, G. (2016) (eds.). *Science education in China: Policy, practice, and research*. New York: Springer.
8. Zhang, B., Fulmer, G., Liu, X., Hu, W., Peng, S., & Wei, B. (2014) (eds.). *Proceedings of the 2012 International Conference on Science Education, Nanjing, P. R. China*. New York: Springer.
7. Liu, X. (2010). *Using and developing measurement instruments in science education: A Rasch Modeling approach*. Charlotte, NC: Information Age Publishing.
6. Liu, X. (2009a). *Linking competence to opportunities to learn: Models of competence and data mining*. New York: Springer.
5. Liu, X. (2009b). *Essentials of science classroom assessment*. Thousand Oaks, CA: Sage Publications.
4. Liu, X. (2007) (Ed.). *Great ideas in science education: Case studies of noted living science educators*. Rotterdam, the Netherlands: Sense Publishers.
3. Liu, X., & Boone, W. (2006) (eds.) *Applications of Rasch measurement in science education*. Maple Grove, MN: JAM Press.
2. Liu, X. (1996) (Ed.). *Mathematics and science curriculum change in the People's*

Republic of China. Lewiston, NY: The Edwin Mellen Press.

1. Science Teaching Research Group (Zeng, Z., Liu, X., Liu, Y.) (1987). *Science and technology in school curriculums: Case study 1 People's Republic of China*. Paris: UNESCO.

Refereed Journal Articles

82. Zhai, Y., Tripp, J., & Liu, X. (2024). Science teacher identity research: A scoping literature review. *International Journal of STEM Education*, April, 11(20), 1-30. <http://doi.org/10.1186/s40594-024-00481-8>
81. Thayaseelan, K., Zhai, Y., Li, S., & Liu, X. (2024). Revalidating a measurement instrument of spatial thinking ability for junior and high school students. *Disciplinary and Interdisciplinary Science Education Research*, 6, 3. <https://diser.springeropen.com/articles/10.1186/s43031-024-00095-8>
80. Zhang, L., Liu, X., & Feng, H. (2023). Development and validation of an instrument for assessing scientific literacy from junior to senior high school. *Disciplinary and Interdisciplinary Science Education Research*, 5, article #21. <https://diser.springeropen.com/articles/10.1186/s43031-023-00093-2>
79. Waight, N., Whitford, M., Liu, X. (2023). Like they are everyday substances, you like see them, hold them, use them every day”: Students’ Understanding of Big Ideas and Macro and Submicro Chemistry Phenomena in the Context of Computer-based Models. *Research in Science Education*, 53, 935–960. <http://doi.org/10.1007/s11165-023-10114-9>
78. Chi, S., Wang, Z., & *Liu, X. (2023). Assessment of context-based chemistry problem-solving skills: Test design and results from ninth-grade students. *Research in Science Education*, 53, 295–318. <http://doi.org/10.1007/s11165-022-10056-8>
77. Liu, R., *Liu, X., & Hutson, L. (2022). Development and validation of a formative evaluation instrument for college teaching improvement. *International Journal of Teaching and Learning in Higher Education*, 33(3), 407-428. <https://isetl.org/ijtlhe/pdf/IJTLHE4124.pdf>
76. Li, S., *Liu, X., Yang, Y., Tripp, J. (2022). Effects of teacher professional development and science classroom learning environment on students' science achievement. *Research in Science Education*. 52, 1031–1053. <https://doi.org/10.1007/s11165-020-09979-x>
75. Chi, S., *Liu, X., Wang, Z. (2021). Comparing student science performance between hands-on and traditional item types: A many-facet Rasch analysis. *Studies in Educational Evaluation*, 70, September, article #100998. <https://doi.org/10.1016/j.stueduc.2021.100998>
74. Shi, F., Wang, L., *Liu, X., & Chiu, M-H (2021). Development and validation of an observation protocol for measuring science teachers’ modeling-based teaching

- performance (MBTP). *Journal of Research in Science Teaching*, 58(9), 1359-1388.
<http://doi.org/10.1002/tea.21712>
73. Chi, S., Wang, Z., & *Liu, X. (2021). Moderating effects of teacher feedback on the associations among inquiry-based science practices and students' science-related attitudes and beliefs. *International Journal of Science Education*. 43:14, 2426-2456.
<https://www.tandfonline.com/doi/full/10.1080/09500693.2021.1968532>
72. Li, S., *Liu, X., Tripp, J., Yang, Y. (2021). From ICT availability to student science achievement: Mediation effects of ICT psychological need satisfactions and interest across genders. *Research in Science and Technological Education*.
<https://doi.org/10.1080/02635143.2020.1830269>
71. Wang, C., & *Liu, X., Wang, L., Sun, Y., & Zhang, H. (2021). Automated scoring of Chinese Grades 7–9 students' competence in interpreting and arguing from evidence. *Journal of Science Education and Technology*, 30(2), 269–282.
<https://doi.org/10.1007/s10956-020-09859-z>
70. Park, M., & *Liu, X. (2021). An investigation of item difficulty patterns by energy aspects across biology, chemistry, environmental science and physics. *Research in Science Education*. 51, 43–60.
<https://doi.org/10.1007/s11165-019-9819-y>
69. Yang, Y., *Liu, X., & Gardella, J. A. (2020). Effects of a professional development program on science teacher knowledge and practice, and student understanding of interdisciplinary science concept. *Journal of Research in Science Teaching*. 57(7), 1028-1057. <https://doi.org/10.1002/tea.21620>.
68. Liu, X., & Wang, L. (2019). Editorial: Disciplinary and interdisciplinary science education research. *Disciplinary and Interdisciplinary Science Education Research*, 1.1
<https://doi.org/10.1186/s43031-019-0001-1>
67. Chi, S., Wang, Z., & *Liu, X. (2019). Investigating disciplinary context effect on student scientific inquiry competence. *International Journal of Science Education*, 41(18), 2736-2764. <https://doi.org/10.1080/09500693.2019.1697837>
66. Luo, T., Wang, J., *Liu, X., & Zhou, J. (2019). Development and application of a scale to measure students' STEM continuing motivation. *International Journal of Science Education*, 41(14), 1885-1904 <https://doi.org/10.1080/09500693.2019.1647472>
65. Lu, S., Bi, H., & *Liu, X. (2019). A phenomenographic study of 10th grade students' understanding of electrolytes. *Chemistry Education Research and Practice*, 20, 204-212. DOI: <https://10.1039/C8RP00125A>
64. Lu, S, Bi, H., & *Liu, X. (2018). The effects of explanation-driven inquiry on students' conceptual understanding of redox. *International Journal of Science Education*, 40(15), 1857-1873.

<https://www.tandfonline.com/doi/pdf/10.1080/09500693.2018.1513670?needAccess=true>

63. Chi, S., *Liu, X., Wang, Z., & Han, S-W (2018). Moderation of the effects of scientific inquiry activities on low SES students' PISA 2015 science achievement by school teacher support and disciplinary climate in science classroom across gender. *International Journal of Science Education*, 40(11), 1284-1034.
<https://doi.org/10.1080/09500693.2018.1476742>
62. Yang, Y., *Liu, X., & Gardella, J. A. (2018). Effects of professional development on teacher pedagogical content knowledge, inquiry teaching practices, and student understanding of interdisciplinary science. *Journal of Science Teacher Education*, 29(4), 263-282.
61. Zhang, R., *Liu, X., Yang, Y., Tripp, J., & Shao, B. (2018). Preservice science teachers' instructional design competence: Characteristics and correlations. *Eurasia Journal of Mathematics, Science and Technology Education*, 14(3):1075–1096.
60. Chi, S., Wang, Z., *Liu, X., & Zhu, L. (2017). Associations among attitudes, perceived difficulty of learning science, gender, parents' occupation and students' scientific competencies. *International Journal of Science Education*, 39(16), 2171-2188.
59. Yang, Y., He, P., & *Liu, X. (2017). Validation of an instrument for measuring students' understanding of interdisciplinary science in grades 4-8 over multiple semesters: a Rasch measurement study. *International Journal of Mathematics and Science Education*, 16(4), 639–654.
58. Park, M., *Liu, X., Waight, N., & Smith, E. (2017). The effect of computer models as formative assessment on student understanding of the nature of models. *Chemical Educational Research and Practice*, 18, 572-581.
57. Park, M., *Liu, X., & Waight, N. (2017). Development of the connected chemistry as formative assessment pedagogy for high school chemistry teaching. *Journal of Chemical Education*, 94(3), 273-281.
56. Park, M., & *Liu, X. (2016). Assessing understanding of the energy concept in different science disciplines. *Science Education*, 100, 483-516
55. Ding, L., Wei, X., and Liu, X. (2016). Variations in university students' scientific reasoning skills across majors, years, and types of institutions. *Research in Science Education*, 46(5), 613-632.
54. Hadenfeldt, J. C., & Neumann, K., Bernholt, S., Liu, X., & Parchmann, I. (2016). Students' progression in understanding the matter concept. *Journal of Research in Science Teaching*, 53(5), 683–708
53. He, P., *Liu, X., Zheng, C., & Jia, M. (2016). Using Rasch measurement to validate an

- instrument for measuring the quality of classroom teaching in secondary chemistry lessons. *Chemistry Education Research and Practice*, 17, 381-393
52. Chi, S., *Liu, X., & Gardella, J. A. (2016). Measuring university students' perceived self-efficacy in science communication in middle and high schools. *Universal Journal of Educational Research*, 4(5), 1089-1102.
 51. Huffman, K., Perin, D., & Liu, X. (2015). Integrating reading skills in an introductory science classroom, *Journal of College Science Teaching*, 44(5), 10-15.
 50. Grant, B., *Liu, X., & Gardella, J. A. (2015). Supporting the development of science communication skills in STEM university students: Understanding their learning experiences as they work in middle and high school classrooms. *International Journal of Science Education: Part B*, 5(2), 139–160.
 49. Waight, N., Liu, X., & Gregorius, R. (2015). Understanding the life cycle of computer-based models: the role of expert contributions in design, development and implementation, Educational Technology. *Educational Technology Research and Development*, 63, 831-859.
 48. Fulmer, G., Liang, L., & Liu, X. (2014). Applying a force and motion learning progression over an extended time span using the Force Concept Inventory. *International Journal of Science Education*, 36(17), 2918-2936.
 47. Hadenfeldt, J. C., *Liu, X., & Neumann, K. (2014). Framing students' progression in understanding matter: A review of previous research. *Studies in Science Education*, 50(2), 181-208.
 46. Chowdhary, B., *Liu, X., Yerrick, R., Smith, E., & Grant, B. (2014). Examining science teachers' development of interdisciplinary science inquiry pedagogical knowledge and practices. *Journal of Science Teacher Education*, 25(8), 865-884.
 45. Wei, S., *Liu, X., & Jia, Y. (2014). Using Rasch measurement to validate the measurement instrument: Students' Understanding of Models in Science, *International Journal of Mathematics and Science Education*. 12(5), 1067-1082.
 44. Waight, N., Liu, X., Gregorius, R. M., Smith, E., & Park, M. (2014). Teacher conceptions and approaches associated with an immersive instructional implementation of computer-based models and assessment in secondary chemistry classrooms. *International Journal of Science Education*, 36(3), 467-505.
 43. Hadenfeldt, J. C., Bernholt, S., *Liu, X., Neumann, K., & Parchmann, I. (2013). Using ordered multiple-choice Items to assess students' understanding of the structure and composition of matter. *Journal of Chemical Education*, 90(12), 1602–1608.
 42. Liu, X. (2013). Difficulties of items related to energy and matter: Implications for

- learning progression in high school chemistry. *Educación Química*, 14, 1-7.
41. Liu, X. (2013). Baselines for the Pan-Canadian science curriculum framework. *Journal of Applied Measurement*, 14(3), 249-261.
 40. Ding, L., & Liu, X. (2012). Getting started with quantitative methods in physics education research," in *Getting Started in PER*, edited by C. Henderson and K. A. Harper (American Association of Physics Teachers, College Park, MD, 2012), Reviews in PER Vol. 2, <<http://www.per-central.org/items/detail.cfm?ID=12601>>.
 39. Zheng, Y., Liu, X. (2012). Internet vs. matter: Differences in students' concept development from elementary through high School. *International Journal of Cyber Behavior, Psychology and Learning*, 2(4), 60-72.
 38. Liu, X., Liang, L., & Liu, E. (2012). Editorial: Science education research in China: Challenges and promises. *International Journal of Science Education*, 34(13), 1961-1970.
 37. Wang, S., Liu, X., & Zhao, Y. (2012). Opportunities to learn in school and at home: How can they predict students' understanding of basic science concepts and principles. *International Journal of Science Education*, 34(13), 2061-2088.
 36. Liu, X., Waight, N., Roberto Gregorius, G., Smith, E., & Park, M. (2012). Developing computer model-based assessment of chemical reasoning: A feasibility study. *Journal of Computers in Mathematics and Science Teaching*, 31(3), 259-281.
 35. Wei, S., *Liu, X., & Wang, Z., & Wang, X. (2012). Using Rasch measurement to develop a computer modeling-based instrument to assess students' conceptual understanding of matter. *Journal of Chemical Education*, 89 (3), pp 335-345.
 34. *Liu, X., & Whitford, M. (2011). Opportunities-to learn at home: Profiles of students with and without reaching science proficiency. *Journal of Science Education and Technology*, 20(4), 375-387.
 33. Mitin, V., Liu, X., Bell, M., & Fulmer, G. (2009). Developing a test for assessing undergraduate engineering students' knowledge and understanding of nanoelectronics concepts. *Journal of Materials Education*, 31 (3-4), 175-200.
 32. Liu, X. (2009). Beyond science literacy: Science and the public. *International Journal of Environmental & Science Education*. 4(3), 301-311.
 31. Lu, X., Zhang, B., Ling, L., Fulmer, G., Kim, B., & Yuan, H. (2009). Alignment between the physics content standard and standardized test: A Comparison among US-NY, Singapore, and China-Jiangsu. *Science Education*, 93(5), 777-797.
 30. *Liu, X., & Fulmer, G. (2008). Alignment between the science curriculum and

- assessment in selected NY state regents exams. *Journal of Science Education and Technology*, 4(17), 373- 383.
29. Clements, D. H., Sarama, J., & Liu, X. (2008). Development of a measure of early mathematics achievement using the Rasch model: The research-based early math assessment. *Educational Psychology*, 28(4), 457-482.
 28. Liu, X., & Ruiz, M. (2008). Using data mining to predict K-12 students' performance on large-scale assessment items related to energy. *Journal of Research in Science Teaching*, 45(5), 554-573.
 27. Tan, D., Taber, K., Liu, X., Richard K. Coll, Lorenzo, M., & Li, J. (2008). Students' conceptions on ionisation energy: A cross-cultural study. *International Journal of Science Education*, 30(2), 1-21.
 26. Liu, X. (2007). Growth in students' understanding of matter during an academic year and from elementary through high school. *Journal of Chemical Education*, 84(11), 1853-1856.
 25. Zhang, B., Liu, X., & Krajcik, J. (2006). Expert models and modeling processes associated with a computer modeling tool. *Science Education*, 90(4), 579-604.
 24. Liu, X. (2006a). Effect of combined hands-on laboratory and computer modeling on student learning of gas laws: A quasi-experimental study. *Journal of Science Education and Technology*, 15(1), 89-100.
 23. Liu, X. (2006b). Student competence in understanding the matter concept and its implications for science curriculum standards. *School Science and Mathematics*, 106(5), 220-227.
 22. *Liu, X., & Lesniak, K. (2006). Progression in children's understanding of the matter concept from elementary to high school. *Journal of Research in Science Teaching*, 43(3), 320-347.
 21. *Liu, X., & Collard, S. (2005). Using Rasch model to validate stages of understanding the energy concept. *Journal of Applied Measurement*, 6(2), 224-241.
 20. *Liu, X., & Lesniak, K. (2005). Students' progression of understanding the matter concept from elementary to high school. *Science Education*, 89(3), 433-450.
 19. Liu, X., & McKeough, A. (2005). Developmental growth in students' concept of energy: An analysis of selected items from the TIMSS database. *Journal of Research in Science Teaching*, 42(5), 493-517.
 18. Liu, X., & MacIsaac, D. (2005). An investigation of factors affecting the degree of impetus theory application. *Journal of Science Education and Technology*, 14(1), 101-

- 117.
17. Liu, X. (2004). Using concept mapping for assessing and promoting relational conceptual change in science. *Science Education*, 88(3), 373-396
 16. Liu, X., & Tang, L. (2004). The progression of student conceptions of energy: A cross-grade, cross-culture study. *Canadian Journal of Science, Mathematics, and Technology Education*, 4(1), 35-49.
 15. Liu, X., & Ebenezer, J. (2002). Descriptive categories and structural characteristics of students' conceptions: An exploration of the relationship. *Research in Science and Technological Education*, 20(1), 111-132.
 14. Liu, X., Ebenezer, J., & Fraser, D. (2002). Structural characteristics of university engineering students' conceptions of energy. *Journal of Research in Science Teaching*, 39(5), 423-441.
 13. Liu, X. (2001). Synthesizing research on students' conceptions in science. *International Journal of Science Education*, 23(1), 55-81.
 12. Liu, X. (2000). Elementary school students' logical reasoning on rolling. *International Journal of Technology and Design in Education*, 10(1), 3-20.
 11. Liu, X. (1999). Evaluating clusters of concept maps for assessing students' structural knowledge in science. *Alberta Science Education Journal*, 31(2), 14 - 26.
 10. Liu, X., Macmillan, R., & Timmons, V. (1998). Assessing the impact of computer integration into the curriculum. *Journal of Research on Computing in Education*, 31(2), 189 - 203.
 9. Liu, X. (1998). Structural characteristics of students' conceptions about natural phenomena. *Research in Science and Technological Education*, 16(2), 177-202.
 8. Liu, X., Macmillan, R., & Timmons, V. (1998). Integration of computers into the Curriculum: How teachers may hinder students' use of computers. *McGill Journal of Education*, 33(1), 51-69.
 7. Macmillan, R., Liu, X., & Timmons, V. (1997). Teachers, computers, and the Internet: The first stage of a community-initiated project for the integration of technology into the curriculum. *Alberta Journal of Educational Research*, 3(4), 222-234.
 6. Liu, X., & Hinchey, M. (1996). The internal consistency of a concept mapping scoring scheme and its effect on prediction validity. *International Journal of Science Education*, 18(8), 921-938.
 5. Tong, L., & Liu, X. (1995). Programmed elicitation in secondary school chemistry

teaching: A ten-year summary. *Science Education*, 79(6), 667-692.

4. Liu, X. (1988). Issues in science education in China. *Educational Research and Experiment*, 2, 18-21. [In Chinese]
3. Liu, X. (1988). The content structure of the integrated science curriculum. *Suzhou University Journal (Special Issue on Integrated Science)*, 57-61. [In Chinese]
2. Liu, X. (1987). On educational research methodology. *Educational Review*, 4, 10 - 13. [In Chinese]
1. Liu, X. (1987). An empirical study on the teachers' selection process of secondary chemistry teaching methods. *Educational Research*, 7, 41-46. [In Chinese]

Refereed Book Chapters

35. Liu, X. (2024). Reflection on the learning progression approach to promoting student learning: Commentary for Section II. In H. Jin, D. Yan, and J. Krajcik (eds.), *Handbook on Science Learning Progressions (chapter 18)*, New York: Routledge.
34. Liu, X., Boone, W. (2023). Introduction. In X. Liu and W. Boone (eds.), *Advances in applications of Rasch measurement in science education* (chapter 1, pp. 1-18), Cham, Switzerland: Springer.
33. Liu, X., & Wang, L. (2023). Introduction. In X. Liu and L. Wang (eds.), *Volume 11 - The rise of STEM education*, in R. Tierney, F. Rizvi, K. Ercikan and G. Smith (eds.), *International Encyclopedia of Education (4th edition)*. Oxford, UK: Elsevier.
32. Liu, X., Rates, C., showers, A., Hutson, L., & Baumstark, T. (2019). Redesigning science courses to enhance student engagement and performance. In J. J. Mintzes and E. M. Walter (eds.), *Active learning in college science: The case for evidence-based practice (chapter 19, pp. 291-306)*. New York: Springer.
31. Liu, X., & Ma, W. (2018). Why Is Confucianism Still Relevant in the Globalized 21st-Century? In X. Liu and W. Ma (eds.), *Confucianism reconsidered: Insights for American and Chinese education in the 21st century*. Albany, NY: SUNY Press.
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29. Liu, X., Liang, L., & Fulmer, G. (2016). Conclusion. In L. Liang, X. Liu and G. Fulmer (eds.), *Science education in China: Policy, practice, and research*. New York: Springer.
28. Liang, L., Liu, X., & Fulmer, G. (2016). Introduction. In L. Liang, X. Liu and G. Fulmer (eds.), *Science education in China: Policy, practice, and research*. New York: Springer.

27. Liu, X. (2016). Commentary: Innovative Curriculum Materials: Development, Pilot-Testing, and Scaling-Up. In Mei-Hung Chiu (Ed.), *Science education research and practice in Asia (chapter 26, pp. 483-488)*. New York: Springer.
26. Liu, K., & Liu, X. (2016). Opportunities to learn at home and Chinese-American high school students' mathematics achievement. In Li G. & M. Wen (eds.), *Chinese heritage students in north American schools: Understanding hearts and minds beyond test scores* (Chapter 8, pp. 120-134). New York: Routledge.
25. Liu, X. (2014). Paradigm contrast: A personal reflection of approaches to preservice science teacher education in China and North America. In W. Ma (ed.), *East meets west in teacher preparation: Crossing Chinese and American borders* (Chapter 10, pp.127-142). New York: Teachers College Press.
24. *Liu, X., & Park, M. (2014). Contextual dimensions of the energy concept and implications for energy teaching and learning. In Chen, R. F., Eisenkraft, A., Fortus, D., Krajcik, J., Neumann, K., Nordine, J. C. & Scheff, A. (eds.). *Teaching and learning of energy in K-12 education* (Chapter 10, pp. 175-186). New York: Springer.
23. Liu, X. (2014). Expanding notions of scientific literacy: A re-conceptualization of aims of science education in the knowledge society. In N. Mansour and R. Wegerif (eds.), *Science education for diversity in knowledge society (pp. 23-39)*. Springer.
22. Liu, X. (2012). Using Learning Progression to Organize Learning Outcomes: Implications for Assessment. In S. Bernholt, K. Neumann, & P. Nentwig (Eds.), *Making It Tangible - Learning Outcomes in Science Education* (pp. 309–325). Münster: Waxmann.
21. Liu, X. (2012). Developing measurement instruments for science education research: Past, present, and future (chapter 43). In B. Fraser, K. Tobin, and C. McRobbie (eds.), *Second International handbook of research in science education (pp. 651-665)*. New York: Springer.
20. Olac-vaw, R., Vagidov, N. Z., Petrou, A., Liu, X., & Mitin, V. (2011). Developing experiments to accompany lectures on quantum mechanics for engineers. *Proceedings of the Innovations in Engineering and Technology Education Conference*. Albany, NY: American Society for Engineering Education.
19. Mitin, V., Vagidov, N. Z., Liu, X., & Petrou, A. (2011). Development of a new lecture/lab course on quantum mechanics for engineering students. *Proceedings of the Innovations in Engineering and Technology Education Conference*. Albany, NY: American Society for Engineering Education.
18. Liu, X., & Koepsell, D. (2010). Developing a master's degree program in science and the public. In P. Kurtz and Fujun Ren (eds.), *Improving science spirits and building a harmony society (pp. 84-93)*. Beijing: Chinese Science and Technology Press. [in Chinese]

17. Liu, X. (2009). Standardized measurement instruments in science education. In M-W Roth and K. Tobin (eds.), *The world of science education: Handbook of Research in North America* (pp. 649-677). Rotterdam, the Netherlands: SensePublishers.
16. Liu, X., & Li, G. (2009). Diversity and equity for Asians in North America: Unpacking the model minority myth. In M-W Roth and K. Tobin (eds.), *The world of science education: Handbook of Research in North America* (pp. 369-388). Rotterdam, the Netherlands: SensePublishers.
15. Sha, Li, & *Liu, X. (2008). Non-linear dynamic modeling of microdevelopmental processes of students' conceptual change in science. In Jonathon E. Larson (Ed.), *Educational psychology: Cognition and learning, individual differences and motivation*, Hauppauge, NY: Nova Science Publishers, Inc.
14. Mitin, V., Vagidov, N., & Liu, X. (2008). Developing a lab course in nanotechnology for undergraduate engineering students. *Proceedings of 2008 ASEE Conference & Exhibition, AC 2008-1736*, pp.1-8.
13. Liu, X., Zawick, J., & Arnold, J. (2008). Using data to reform science instruction. In J. Gess-Newsome, J. Luft, and R. Bell (eds.), *Reforming secondary science instruction* (pp. 77- 89). Arlington, VA: NSTA Press.
12. Liu, X. (2007). Introduction. In X. Liu (Ed.), *Great ideas in science education: case studies of noted living science educators* (pp. 1-4). Rotterdam, the Netherlands: SensePublishers.
11. Lee, Y-F., & *Liu, X. (2006). Issues related to integrating computer simulations into the physics classroom. In Riichiro Mizoguchi, Pierre Dillenbourg & Zhiting Zhu (eds), *Poster Paper Notes of the 14th International Conference on Computers in Education (ICCE2006)*, Beijing, P. R. China.
10. Liu, X. (2006). Mapping out students' matter concept development from elementary to high school. In Liu X. and W. Boone (eds.), *Applications of Rasch measurement in science education* (pp.165-187). Maple Grove, MN: JAM Press.
9. Liu, X., & Boone, W. (2006). Introduction to Rasch measurement in science education. In Liu X. and W. Boone (eds.), *Applications of Rasch measurement in science education* (pp. 1- 22). Maple Grove, MN: JAM Press.
8. Liu, X., & Ebenezer, J. (2002). Descriptive categories and structural characteristics of students' conceptions: An exploration of relations. In R. Tousant (Ed.), *Conceptual change in science: theory into practice* (pp. 64-95). Montreal: New Media Press. (in French).
7. Liu, X., Timmons, V., & Macmillan, R. (1996). Teaching science through the Internet for

- responsible citizen: Promises and obstacles. In K. Calhoun, R. Panwar, & S. Shrum (eds.), *Proceedings of the 8th International Organization for Science and Technology Education Symposium* (pp. 151 – 155). Edmonton, Canada: IOSTE
6. Liu, X. (1996). Curriculum change in school chemistry. In X. Liu (Ed.), *Mathematics and science curriculum change in the People's Republic of China* (pp. 33-61). Lewiston, NY: The Edwin Mellen Press.
 5. Liu, X. (1996). Curriculum change: A sociopolitical perspective. In X. Liu (Ed.), *Mathematics and science curriculum change in the People's Republic of China* (pp. 137 - 152). Lewiston, NY: The Edwin Mellen Press.
 4. Liu, X. (1996). Curriculum change: A historical perspective. In X. Liu (Ed.), *Mathematics and science curriculum change in the People's Republic of China* (pp. 153 - 167). Lewiston, NY: The Edwin Mellen Press.
 3. Liu, X., & Ma, X. (1996). Chinese mathematics and science curriculum: A critique. In X. Liu (Ed.), *Mathematics and science curriculum change in the People's Republic of China* (pp. 167-178). Lewiston, NY: The Edwin Mellen Press.
 2. Liu, X. (1993). The validity and reliability of concept mapping as an alternative science assessment. In Joseph Novak (Ed.), *Proceedings of the third international seminar on misconceptions and strategies in science and mathematics (electronic publication)*. Cornell University. (<http://www.mlrg.org/misconproceedings3and4.html>)
 1. Liu, X. (1991). Entries on educational research methodology. In T. Chun et al (Ed.), *Chinese Dictionary of Educational Research* (pp. 125-146). Shanghai: Shanghai Education Press. [In Chinese]

Book Translation

3. Huang, M, Zeng, S., Zeng, Z., & Liu, X. (1992). *Learning how to learn (by J. Novak & B. Gowin, Cambridge University Press)*. Zhengzhou, Henan Education Press. [Translation from English to Chinese]
2. Liu, X. (1989). *More ways to use your head (by Stuart Litvak, Prentice-Hall)*. Shanghai: Shanghai People's Publishing House. [Translation from English to Chinese]
1. Yan, Z., & Liu, X. (1989). *Bilingualism and education* (by Jim Cummins & Merrill Swain, Addison Wesley Publishing Company). Beijing: Guangmin Daily Press. [Translation from English to Chinese]

ERIC Microfiche

2. Liu, X. (1994). The validity and reliability of concept mapping as an alternative science assessment when Item Response Theory is used for scoring. *ERIC Document ED 370992*. Originally presented at the annual meeting of the American Educational Research Association. New Orleans, LA, April.

1. Liu, X. (1992). The dimensionality of test data generated by compensatory and non-compensatory multidimensional IRT models and its effect on model-data-fit. *ERIC document: ED 359214*. Originally presented at the annual meeting of the Canadian Society for the Study of Education, Charlottetown, PEI, June, 1992.

Unpublished Research Monographs/Reports

5. Belleveau, G., Liu, X., & Murphy, E. (2002). *Teacher workload in Prince Edward Island*. A report commissioned by the Prince Edward Island Teachers' Federation.
4. Liu, X., & Younker, R. (1999). Effective uses of graphing Calculators for teaching secondary school mathematics. In Ray Doiron et al. (eds.), *Teaching and learning with information technology*. Final Report to the Knowledge Economy Partnership Secretariat.
3. Timmons, V., Liu, X., Macmillan, R., MacKinnon, R., & MacDonald, L. (1997). *Integration of computers into the curriculum: Stage 2*. A report submitted to the Office of Learning Technology, Human Resources Development Canada.
2. Liu, X., & MacPherson, C. (1996). *Students' conceptions in Science*. St. Francis Xavier University.
1. Timmons, V., Liu, X., & Macmillan, R. (1995). *Integration of computers into the curriculum: Stage 1*. A report submitted to the Office of Learning Technology, Human Resources Development Canada.

Presentations: Invited/Keynote

66. STEM education research: Its origin, present and future. Invited presentation at the International Science Education Forum, Chongqing Normal University, Oct. 28, 2023, virtual.
65. Writing and revising articles to publish in DISER. Invited talk at the Science Education Research Institute, Beijing Normal University, June 15, 2023
64. Fundamentals of educational measurement. A virtual workshop for the Directorate of Education and Human Resources, July 13, 2022, National Science Foundation.
63. Current and Future Development of International Science Education Research. An invited talk at the Academy of International Science Education, Aug. 21, 2020, Beijing Normal University. (Virtual)
62. Preservice science teacher education: What can US and China learn from each other? An invited talk at the International Forum on Improving Science Literacy for all Students, Oct. 30, 2019, Beijing Normal University.
61. Connected Chemistry as Formative Assessment. An invited talk at the Asian Chemistry Education Summit, Nov. 28, 2018, Taiwan Normal University.

60. Assessing science/scientific literacy: past, present and future. Invited talk at the Science Education International Forum, Nov. 3, 2018, Beijing Normal University.
59. Research in interests in science. Invited talk at the Beijing Normal University National Science Assessment Summit, Aug. 25, 2018.
58. Using R for Rasch analysis to explore student learning progression. A workshop conducted at the 2018 NARST International Annual Conference, Atlanta, Georgia, March 10, 2018.
57. Using Rasch modeling to develop measurement instruments: A workshop. Shaanxi Normal University, Jan. 16 - 28, 2018.
56. Reforming undergraduate STEM teaching in research universities in the US. Shaanxi Normal University, Jan. 15, 2018.
55. Assessment of three-dimensional learning of the Next Generation Science Standards. Shaanxi Normal University, Jan. 16, 2018.
54. How to publish in English journals? Northeast Normal University, Oct. 30, 2017.
53. Reforming undergraduate STEM teaching in research universities in the US. Northeast Normal University, Oct. 30, 2017.
52. Assessment of three-dimensional learning of the Next Generation Science Standards. Northeast Normal University, Oct. 29, 2017.
51. Assessment of three-dimensional learning of the Next Generation Science Standards. Shandong Normal University, Jan. 12, 2017.
50. Latest development in science assessment research: A case study of most recently NSF funded projects. Yinan, Taiwan, Nov. 1, 2016.
49. Monitoring Science Education Quality Workshop Series. Beijing Normal University, May 23-27, 2016.
48. From one-way information flow to dynamic engagement: A contextualized approach to science communication. Invited talk given at the Strategy and Practice of Science Communication in Different Social Contexts. Beijing, Oct. 17th – 18th, 2015.
47. Science education research in the west and east: Global challenges and opportunities. Key- note speech given to the 4th East-Asia Science Education Research Association bi-annual conference, Beijing, Aug. 15-18, 2015.
46. The most recent school science education reform in the US: Implications for mass

- innovation and entrepreneurship. Invited talk given at the International Symposium on Scientific Culture in Mass Innovation and Entrepreneurship, Beijing, Oct. 15-16, 2015.
45. Scholarship of teaching and learning. SUNY Conference on Teaching and Technology (CIT). May 28, 2015.
 44. Publishing in English refereed journals in science education. Shandong Normal University, Jan. 5 – 9, 2015.
 43. Using and developing measuring instruments for discipline-based education research, Rochester Institute of Technology, Feb. 26, 2014
 42. From science inquiry to interdisciplinary science inquiry: Preparing teachers for next generation science standards. Key-note speech given to the annual conference of the Korean Association for Science Education (KASE), Daegu, South Korea, Feb. 13, 2014.
 41. Grand challenges in science education: Implications for chemical education research. Key- note speech given to the 10th annual conference of the Chinese Association of the Chemical Curriculum and Pedagogy, Wuhan, Nov. 18, 2013.
 40. Latest development in science education reforms in the US. Northeast Normal University, Nov. 15, 2013
 39. Advanced quantitative research methods in science education. A course taught at Beijing Normal University, January, 2013
 38. From science literacy to science engagement: The Science and the Public EdM Program, Chinese Research Institute for Science Popularization, Jan. 15, 2013
 37. From No Child Left Behind to Race to the Top: Latest Science Education Reforms in the US, Shaanxi Normal University, Jan. 4, 2013
 36. Contextual dimensions of the energy concept and implications for teaching and learning. The Energy Summit, Michigan State University, Dec. 14-17, 2012.
 35. Latest Developments in Science Education Reforms in the US, Hangzhou Normal University, Oct. 17, 2012.
 34. Developing measurement instruments using Rasch measurement, East China Normal University, Oct. 16, 2012.
 33. Publishing in English SSCI Journals in Science Education. A workshop given at the 2012 International Conference on Science Education, Nanjing, P. R. China, Oct. 15, 2012.
 32. Preservice Science Teacher Education: What can China and the US learn from each other? Invited key-note speech at the 2012 International Conference on Science

- Education, Nanjing, P. R. China, Oct. 14, 2012.
31. Conducting and writing doctoral dissertations in education. University of Macau, April 24, 2012.
 30. Connected Chemistry as Formative Assessment. University of Georgia, Nov. 9, 2011.
 29. International perspectives on large-scale science assessment. Invited talk given at the strand 10 symposium, International Conference of the National Association for Research in Science Teaching, Orlando, FL, April, 2011.
 28. Using learning progression to organize learning outcomes: Implications for assessment. Invited talk given at the 5th IPN-York Symposium, Leibniz-Institut für die Pädagogik der Naturwissenschaften und Mathematik (IPN), Germany, March 15 - 20, 2011.
 27. A learning progression approach to formative assessment. Invited talk given at Nanyang Technological University, Jan. 12, 2011.
 26. Using Rasch models to develop measurement instruments in science education. Invited workshop given at Beijing Normal University, Nov. 15-17, 2011.
 25. From Science Literacy to Science Engagement: A Case Study of a Master's Degree Program in Science and the Public. Invited Talk at the Oxford Roundtable, Oxford University, UK, March 28 -April, 2, 2010.
 24. Using Rasch Modeling to Measure Learning Progression (Invited workshop at the 6th International Conference on Science, Mathematics and Technology Education), Taiwan, Jan. 19- 22, 2010.
 - 23-16. Using and Developing Measurement Instruments for Chemical Education Research (invited talk to the 13th Asian Chemistry Congress), Sept. 14-16, 2009, Shanghai, P. R. China
 Science Education Lecture Series, Beijing Normal University, Nov. 10 - Dec. 5, 2008
Lecture 1: History of Science and the Origin, Development, and Present State of Science Education Research
Lecture 2: Science Literacy and School Science Education
Lecture 3: Public Understanding of Science and Informal Science Education Lecture 4: Scientists and Science Communication
Lecture 5: International Comparison of Science Education
Lecture 6: Science-Technology-Society (STS) in School Science Education: Its Origin, Development and Current State
Lecture 7: Science and Religion: Are They Compatible? Lecture 8: Science Education and Policy
 15. Science Literacy in Western Countries (invited talk), Nov. 20, 2008, East China Normal

University

14. Computer Models and Modeling in Science Teaching and Learning (invited talk), Nov. 21, 2008, East China Normal University
13. Applications of Rasch Measurement in Developing Science Assessment Items and Instruments (workshop). Project 2061, American Association for the Advancement of Science (AAAS), Aug. 14, 2008
12. Developing Measurement Instruments in Science Education (workshop). China Central Research Institute for Science Popularization, Beijing, Oct, 19, 2007.
11. Applications of Rasch Measurement in Science Education (workshop). University of Duisburg-Essen, Germany. Aug. 29, 2007.
10. Developing Competence in Science Education (invited talk), University of Duisburg-Essen, Germany. Aug. 27, 2007.
9. Applications of Rasch Measurement in Science Education (workshop), National Association for Research in Science Teaching (NARST). New Orleans, April, 2007.
8. Measurement and Evaluation of Science Teaching (workshop), New York University, 2006
7. Constructivism and Inquiry Science Teaching (invited talk), Guangxi Normal University, China, 2001
6. Latest Development in Constructivist Science Teaching (invited talk), Guangxi Normal University, China, 2001
5. Science Educational Reforms in Canada (invited talk), Capital Normal University, China, 2001
4. Integrating the Internet into Secondary Chemistry Teaching (invited talk), Guangxi Normal University, 2001
3. Latest Developments in Computer-Assisted Instruction in Chemistry Teaching (invited talk), Guangxi Normal University, 1999
2. Using Concept Mapping for Constructivist Science Teaching (invited talk), Faculty of Education, University of Manitoba, 1998
1. Student Alternative Conceptions in Science (workshop), Guangxi Normal University, China, June, 1996

Presentations: National and International

77. Tripp, J. & Liu, X. (2024, April). *Defining STEM professional identity: An exploratory study*. Paper presented at the American Educational Research Association Annual Meeting, Philadelphia, PA.
76. Zhai, Y., & Liu, X. (March, 2024). Science career expectations and science-related motivation: A latent profile analysis using PISA 2015 data. Paper presented at the annual NARST International Conference, Denver, CO, March 17-20, 2024.
75. Thayaseelan, K., Zhai, Y., & Liu, X. (March, 2024). *Revalidating a measurement instrument of spatial thinking ability for junior and high school students*. Paper presented at the annual NARST International Conference, Denver, CO, March 17-20, 2024.
74. Tripp, J., Liu, X., & Waight, N. (March, 2024). *Minoritized high schoolers' perceptions of science and scientists*. Paper presented at the annual NARST International Conference, Denver, CO, March 17-20, 2024.
73. Liu, X., & Zhai, Y. (March, 2024). *Science teacher identity research: A scoping literature review*. Paper presented at the annual NARST International Conference, Denver, CO, March 17-20, 2024.
72. Cong, W., Liu, X., & Wang, L. (April, 2021). *Automated scoring of Chinese Grades 709 students' competence in interpreting and arguing from evidence*. Paper presented at the annual NARST International Conference. April 7-10, 2021, Online.
71. Yin, H., Liu, R., & Liu, X. (April, 2021). *Self-Efficacy Scale of Confucius Institute Chinese Teachers: A Rasch-Based Measurement Instrument Development*. Paper presented at the annual meeting of the American Educational Research Association. Online, April 8, 12, 2021.
70. Li, S. & Liu, X. (April, 2020) Integrating Geographic Information System in Secondary Classrooms: Factors in Relation to Spatial Thinking Ability [Poster Session]. AERA Annual Meeting San Francisco, CA <http://tinyurl.com/ruz4g7g> (Conference Canceled).
69. Liu, R. & Liu, X. (April, 2020) Rasch-Based Measurement Development: A Formative Evaluation Instrument for College Teaching [Poster Session]. AERA Annual Meeting San Francisco, CA <http://tinyurl.com/qmqpmch> (Conference Canceled)
68. Liu, X. (October, 2019). Preservice science teacher education: What can US and China learn from each other? An invited talk at the International Forum on Improving Science Literacy for all Students, Oct. 30, 2019, Beijing Normal University.
67. Chi, S., & Liu, X. (April, 2019). Test administration mode effects of hands-on test versus paper-and-pencil test. Paper presented at the annual meeting of the American Educational Research Association, Toronto, April 5 - 9, 2019.
66. Lin, J., Liu, X., Chang, C-Y, Sun, T., & Shi, X. (April, 2019). Developing a measurement

- instrument for teacher key competencies. Paper presented at the annual meeting of the American Educational Research Association, Toronto, April 5 - 9, 2019.
65. Yang, Y., & Liu, X. (April, 2019). 9th and 12th graders' science-related occupational expectations between genders and among races. Paper presented at the NARST annual International Conference, Baltimore, MD: March 31, April 3, 2019.
 64. Li, S., & Liu, X. (April, 2019). GIS integration in secondary school science classrooms: Effects on student and teacher spatial thinking ability. Paper presented at the NARST annual International Conference, Baltimore, MD: March 31, April 3, 2019.
 63. Li, S., & Liu, X. (March, 2018). *Integrating GIS into secondary school science curriculums: A mixed method study on student spatial thinking abilities*. Paper presented at the NARST annual International conference, Atlanta, GA, March 10-13, 2018.
 62. Eades-Baird, M., Liu, X., & Hayden, E. (March, 2018). *Influences on urban science teachers' implementation of literacy: three case studies*. Paper presented at the NARST annual International conference, Atlanta, GA, March 10-13, 2018.
 61. Yang, Y., Liu, X., & Gardella, J. (March, 2018). *Effects of professional development on teacher knowledge, practice, and student learning of interdisciplinary science*. Paper presented at the NARST annual International conference, Atlanta, GA, March 10-13, 2018.
 60. Lin, J., Liu, X., & Chang, C-Y. (March, 2018). *Investigation on professional ethics of science teachers in China's elementary and middle schools*. Paper presented at the NARST annual International conference, Atlanta, GA, March 10-13, 2018.
 59. Liu, X., & Vanzile-Tempsen, C. (April, 2017). *Construct validation of an instrument to measure university student classroom engagement*. Paper presented at the annual meeting of the American Educational Research Association, San Antonio, Texas.
 58. Rate, C., Liu, X., & Vanzile-Tempsen, C. (April, 2017). *Continual improvement of a student evaluation of teaching over seven semesters at a state university*. Paper presented at the annual meeting of the American Educational Research Association, San Antonio, Texas.
 57. Gould, O., Liu, X., Chi, S., & Yang, Y. (April, 2017). *Mutualism: An ethnographic case study on a school's participation in a professional development program in science*. Paper presented at the annual meeting of the American Educational Research Association, San Antonio, Texas.
 56. Chudyk, S. A., Liu, X., Eades-Baird, M., Waight, N., & Yang, Y. (April, 2016). *The implementation of interdisciplinary science inquiry of biology teachers compared to physical science teachers*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through

Research, Baltimore, MD.

55. Eades-Baird, M., & Liu, X. (April, 2016). *Urban science teachers' implementation of common core state standards for ELA within the context of interdisciplinary science inquiry*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Baltimore, MD.
54. Yang, Y., Liu, X., & Eades-Baird, M. (April, 2016). *Effects of an ISEP professional development on teachers' PCK and students' understanding of science*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Baltimore, MD.
53. Yang, Y., Peng, H., Liu, X., & Eades-Baird, M. (April, 2016). *Validation of an instrument for measuring students' understanding of science in grades 4-8 over multiple semesters: A Rasch measurement study*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Baltimore, MD.
52. Park, M., Liu, X., & Johnson, J. (April, 2015). *Toward understanding the relationship between the learning progression of energy and scientific disciplines*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Chicago, IL.
51. He, P., Zheng, C., & Liu, X. (April, 2015). *Development of a coding system and instruments for assessing the quality of instructional behaviors*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Chicago, IL.
49. He, P., Zheng, C., & Liu, X. (April, 2015). *Using Rasch measurement to validate the instrument for evaluating secondary chemistry classroom teaching and learning*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Chicago, IL.
48. Smith, E., & Liu, X. (April, 2015). *Interdisciplinary science inquiry within a school-university partnership: Understanding in-service science teacher's interpretation and implementation of interdisciplinary science inquiry as part of their practice*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Chicago, IL.
47. Eades-Baird, Liu, X., & Chowdhary, B. (April, 2015). *Urban Science Teachers' Beliefs, Perceptions and Implementation of CCSS for ELA/Literacy within Interdisciplinary Science Inquiry*. Paper presented at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Chicago, IL.
46. Smith, E., & Liu, X. (April, 2015). *The Impact of Science Teachers' Orientations on their Understanding and Implementation of Interdisciplinary Science Inquiry*. Paper presented

- at the annual meeting of the NARST-A Worldwide Organization for Improving Science Teaching and Learning through Research, Chicago, IL.
45. Waight, N., Liu, X., & Whitford, M. (April, 2014). *Mapping students' understanding of big ideas of high school chemistry concepts in the context of computer modeling-based teaching and learning*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Pittsburgh, PA.
 44. Borda, E. J., Park, M., & Liu, X. (April, 2014). *Improving upon the Chemical Concepts Inventory: Towards a state-of-the-art summative assessment instrument in chemistry*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Pittsburgh, PA.
 43. Smith, E., & Liu, X. (April, 2014). *The development of in-service science teachers' pedagogical content knowledge related to interdisciplinary science inquiry*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Pittsburgh, PA.
 42. Liu, X., & Fu, L. (April, 2014). *Measuring university students' science communication self-efficacy in middle and high school*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Pittsburgh, PA.
 41. Wei, S., & Liu, X. (April, 2013). *Using Rasch measurement to validate the instrument of Students' Understanding of Models in Science (SUMS)*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Río Grande, Puerto Rico.
 40. Liu, X. (April, 2013). *Promoting interdisciplinary science teaching and learning in schools*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Río Grande, Puerto Rico.
 39. Liu, X., Waight, N., & Smith, E. (April, 2013). *Developing computer model-based formative assessment for high school chemistry*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Río Grande, Puerto Rico.
 38. Waight, N., Liu, X., Gregorius, G., Park, M. (April, 2013). *Computer-based models in chemistry classrooms: Visual literacy to decode and translate model representations*. Paper presented at the annual meeting of the NARST – A Worldwide Association for Promoting Science Teaching and Learning through Research, Río Grande, Puerto Rico.
 37. Liu, X., Waight, N., Gregorius, G., Smith, E., & Park, M. (April, 2012). *Developing computer model-based assessment of learning progression*. Paper presented at the annual

- meeting of the American Educational Research Association, Vancouver, BC, Canada.
36. Liu, X., & Park, M. (March, 2012). *Progression of student understanding of the energy concept*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
 35. Liu, X., Waight, N., Gregorius, G., Smith, E. (March, 2012). *Developing computer model-based formative assessment for high school chemistry*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
 34. Liang, L., Liu, X., & Park, M. (March, 2012). *Chemistry concept inventory: Is it appropriate for summative assessment?* Paper presented at the annual meeting of the National Association for Research in Science Teaching, Indianapolis, IN.
 33. Liu, X., Waight, N., Gregorius, G., Smith, E., & Park, M. (April, 2011). *Developing computer model-based assessment of learning progression*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Orlando, FL.
 32. Liu, X., & Whitford, M. (March, 2010). *Opportunities-to-learn at home: Profiles of students who have reached and failed to reach science proficiency*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, March 21 – 25, 2010, Philadelphia, PA.
 31. Wei, S., & Liu, X. (March, 2010). *Using Rasch modeling to develop a computer modeling-based measurement instrument on students' conceptual understanding of matter*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, March 21 – 25, 2010, Philadelphia, PA.
 30. Liu, X., Zhang, B-H, Liang, L., Fulmer, G., & Kim, B. (April, 2008). *Alignment between the physics content standard and standardized test: A Comparison among US-NY, Singapore, and China-Jiangsu*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Baltimore, MD.
 29. Sabah, S., & Liu, X. (April, 2008). *Developing a two-tiered instrument with confidence levels for assessing students' conceptions of direct current circuits*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, Baltimore, MD.
 28. Liu, X., & Koepsell, D. (Oct. 2007). *Developing an online master's program in science and the public*. Paper presented at the 11th World Congress of the Center for Inquiry. Beijing, P. R. China.
 27. Liu, X., & Ruiz, M. (Aug. 2007). *Using data mining to predict K-12 students' performance on large-scale assessment items related to energy*. Paper presented at the bi-annual conference of the European Science Education Research Association. Malmö, Sweden.

26. Liu, X. (April, 2007). *Trends in science education research: Case studies of living science educators*. Paper presented at the American Educational Research Association annual meeting. Chicago, IL.
25. Liu, X., & Fulmer, G. (April, 2007). *The alignment between NY science curriculum standard and the standardized tests*. Paper presented at the American Educational Research Association annual meeting. Chicago, IL.
24. Lee, Y., & Liu, X. (Nov./Dec., 2006). *Issues related to integrating computer simulations into the physics classroom*. Paper presented at the 14th International Conference on Computers in Education (ICCE2006), Beijing, P. R. China.
23. Liu, X. (April, 2006). *Mapping out students' conceptions of understanding the matter concept*. Paper presented at the annual meeting of the National Association for Research in Science Teaching. San Francisco, CA.
22. Liu, X. (April, 2006). *Sequences of the matter concept developing in national science curriculums: International perspectives*. Paper presented at the annual meeting of the American Educational Research Association. San Francisco, CA.
21. Liu, X. (April, 2005). *Baselines for national science education standards: The case of Canada*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec.
20. Liu, X., & Lesniak, K. (April, 2005). *Progression in children's understanding of the matter concept from elementary to high school*. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Quebec.
19. Liu, X., & Lesniak, K. (April, 2004). *The progression of students' understanding of the matter concept from elementary to high school*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, April, Vancouver, B.C.
18. Liu, X., & Lesniak, K. (April, 2004). *The progression of students' understanding of the matter concept from elementary to high school*. Paper presented at the annual meeting of the National Association for Research in Science Teaching, April, Vancouver, B.C.
17. Liu, X., & McKeough, A. (April, 2003). *Developmental growth in students' concept of energy: An analysis of selected items from the TIMSS database*. Paper presented at the annual meeting of the American Educational Research Association, Chicago.
16. Liu, X., & Collard, S. (June, 2003). *Developing a theory of students' concept development of energy*. Paper presented at the annual meeting of the Jean Piaget Society, Chicago.
15. Sha, L., & Liu, X. (April, 2003). *Dynamic modeling of microdevelopments of Gr. 5*

- students' conceptual change on magnetism.* Paper presented at the annual meeting of the American Educational Research Association, Chicago.
14. Liu, X., & Sha, L. (May, 2001). *Hierarchical linear modeling of student learning a science concept.* Paper presented at the annual meeting of the Canadian Society for the Study of Education, Quebec city, PQ.
 13. Liu, X., & Tang, L. (April, 2001). *Structures of student conceptions of energy.* Paper presented at the annual meeting of the American Educational Research Association, Seattle, WA.
 12. Liu, X., Ebenezer, J., Fraser, D., & Case, J. (April, 1999). *A Phenomenographical study of structural characteristics of students' conceptions about energy.* Paper presented at annual meeting of American Educational Research Association. Montreal, QC.
 11. Liu, X. (March, 1999). *An operational framework for interpreting and assessing students' relational conceptual change in science.* Paper presented at the annual meeting of the National Association for Research in Science Teaching. Boston, MA.
 10. Liu, X. (March, 1998). *The elaboration of rollers: Elementary students' Learning experiences on rolling.* Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
 9. Liu, X. (March, 1998). *Assessing the impact of computer integration on students.* Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
 8. Liu, X. (March, 1998). *Categories and structural characteristics of students' conceptions: An exploration on relations and generalization.* Paper presented at the annual meeting of the National Association for Research in Science Teaching, San Diego, CA.
 7. Liu, X. (March, 1997). *Assessing students' conceptual change in science through structural characteristics of digraphs.* Paper presented at the annual meeting of the American Educational Research Association (AERA), Chicago.
 6. Liu, X. (March, 1997). *Students' conceptual change in structural characteristics on solutions.* Paper presented at the annual meeting of the National Association for Research in Science Teaching (NARST), Chicago.
 5. Liu, X. (June, 1995). *Assessing students' structural knowledge in science through digraphs.* Paper presented at the annual conference of the Canadian Society for the Study of Education, Montreal, Quebec.
 4. Liu, X. (June, 1995). *Restructuring teacher education: Conflicting perspectives.* Paper presented at the annual conference of the Canadian Society for the Study of Education, Montreal, Quebec.

3. Liu, X. (June, 1994). *Preservice science teachers' concerns, expectations and perceptions of science teaching: Are they related?* Paper presented at the annual conference of the Canadian Society for the Study of Education, Calgary, AB.
2. Liu, X., & Bateson, D. (June, 1993). *A statistic for assessing overall model-data-fit of examinees.* Paper presented at the annual conference of the Canadian Society for the Study of Education. Ottawa, ON.
1. Liu, X. (April, 1993). *An empirical study on the relationships among model assumption violation, model-data-fit and invariance properties.* Paper presented at the annual conference of the American Educational Research Association, Atlanta, GA.

Other Presentations: Professional Development for Teachers

UB Annual Summer Science Assessment Workshop (one week), 2004-2015

Summer Institute (One Week): Authentic assessment in high school science teaching, St. Francis Xavier University, 1998

Integrating the Internet into Secondary Science Teaching, West Pictou District High School, N. S., 1998

Using computerized concept mapping to monitor students' conceptual change. West Pictou District School High School, N. S., 1997

Assessing higher order thinking through performance assessment Glace Bay High School, N. S., 1996

Integrating the Internet into the mathematics curriculum, Atlantic Institute of Mathematics, 1995

Alternative assessment in elementary and secondary schools. Guysborough District School Board, N. S., 1995

Training workshop: Surfing the Net. Pictou District School Board, N. S., 1995

Research Supervision – Main Advisor

Post-doc Researchers

Kathleen Lesniak	Post-Doctoral (2003-04)
Chris Whittle	Post-Doctoral (2004-05)
Vanashri Nargund-Josh	Post-Doctoral (2012-13)
Chris Rates	Post-doctoral (2015-2017)
Ingu Kang	Post-doctoral (2015-2017)
Jennifer Tripp	Post-doctoral (2023-2025)

PhD Dissertations

1. English, S. (2005). *The use of dialogic electronic journal writing to facilitate students understanding of chemical bonding.* Unpublished dissertation, University at Buffalo,

State University of New York.

2. Yeshion, T. (2006). *Students' conceptions of evidence during a university forensic science course*. Unpublished dissertation, University at Buffalo, State University of New York.
3. Ford, G., (2007). *Effect of computer-aided instruction versus traditional modes on student PT's learning musculoskeletal special tests*. Unpublished dissertation, University at Buffalo, State University of New York.
4. Sabah, S. (2007). *Developing a two-tiered instrument with confidence levels for assessing students' conceptions of direct current circuits*. Unpublished dissertation, University at Buffalo, State University of New York.
5. Terry, D. (2007). *Using the case study teaching method to promote college students' critical thinking skills*. Unpublished dissertation, University at Buffalo, State University of New York.
6. Fulmer, G. (2007). *Successes and setbacks in collaboration: Connecting teacher practices to contextual pressures and student learning outcomes*. Unpublished dissertation, University at Buffalo, State University of New York.
7. Yu-Fen Lee, Y-F (2009). *Using computer simulations to facilitate conceptual understanding of electromagnetic induction*. Unpublished dissertation, University at Buffalo, State University of New York.
8. Yunus, K. (2009). *Experiences and practices of international mathematics and science teachers in urban high schools*. Unpublished dissertation, University at Buffalo, State University of New York.
9. Zarazinski, J. (2010). *The use of parent involved take-home science activities during student teaching: Understanding the challenges and implementation*. Unpublished dissertation, University at Buffalo, State University of New York.
10. Jeff Arnold, J. (2010). *The effect of design modifications to the typographical layout of the New York State elementary science learning standards on user preference and process time*. Unpublished dissertation, University at Buffalo, State University of New York.
11. Park, M. (2013). *Developing an instrument for assessing students' understanding of the energy concept across science disciplines*. Unpublished dissertation, University at Buffalo, State University of New York.
12. Conway, A. (2014). *Students' and teachers' expectations and experiences on learning science in a science museum*. Unpublished dissertation, University at Buffalo, State University of New York.
13. Grant, B. (2014). *Building capacity within a school-university partnership: An exploration into the perspectives, experiences, and approaches of various stakeholders*. Unpublished

dissertation, University at Buffalo, State University of New York.

14. Smith, E., (2014). *The development of in-service science teachers' pedagogical content knowledge related to interdisciplinary science inquiry*. Unpublished dissertation, University at Buffalo, State University of New York.
15. Michelle Eades-Baird (2015). *Exploring urban science teachers' beliefs, perceptions and implementation of common core state standards for ELA within the context of interdisciplinary science inquiry: A mixed method study*. Unpublished dissertation, University at Buffalo, State University of New York.
16. Zion, G. (2017). *Project Lead The Ways' long-term effects on post-secondary engineering academic success*. Unpublished dissertation, University at Buffalo, State University of New York.
17. Yang, Y. (2017). *Effects of an interdisciplinary science professional development program on teacher pedagogical content knowledge, science inquiry instruction, and student understanding of science crosscutting concepts in twelve public schools: A multi-level modeling study*. Unpublished dissertation, University at Buffalo, State University of New York.
18. Chi, S-H (2018). *Effects of test administration modes on student performances on assessments of the next generation science standards*. Unpublished dissertation, University at Buffalo, State University of New York.
19. Li, S. (2020). *Effects of GIS integration in secondary school classrooms: A mixed-method study on student spatial thinking ability*. Unpublished dissertation, University at Buffalo, State University of New York.
20. Liu, R. (2021). *Developing a learning-oriented formative evaluation approach for college teaching improvement*. Unpublished dissertation, University at Buffalo, State University of New York.
21. Oyer, C. (2022). *Student engagement in an online course and its impact on student learning*. Unpublished dissertation, University at Buffalo, State University of New York.

Mater's Theses

Natalie Atkinson	M. Ed. (1999)
Shelley Carter-Rose	M. Ed. (1999)
Sheila Barnes	M. Ed. (2000)
Dale MacIsaac	M. Ed. (2000)
Derek McEwen	M. Ed. (2001)
Li Sha	M. Ed. (2002)
Stephanie Betts	M. Ed. (2002)
Elizabeth Love	Ed. M. in Science and the Public (2009)
Brian Hughes	Ed. M. in Science and the Public (2009)

Trina Short	Ed. M. in Science and the Public (2010)
B. Bayles	Ed. M. in Science and the Public (2010)
Danielle Smith	Ed. M. in Science and the Public (2010)
Christopher Maute	Ed.M. in Science and the Public (2010)
Sally Haas	Ed. M. in Science and the Public (2011)
Suzanne Mock	Ed. M. in Science and the Public (2011)
Danielle Asplund	Ed. M. in Science and the Public (2011)
Rachelle Ocampo	Ed.M. in Science and the Public (2012)
Lory Snyder	Ed. M. in Science and the Public (2012)
James Nicotri	Ed.M. in Science and the Public (2013)
Diane Schofield-Loomis	Ed.M. in Science and the Public (2014)

Teaching: Courses Taught

State University of New York at Buffalo, USA

Seminar in STEM Education Research
 Using Rasch Modeling to Develop Measurement Instruments
 Seminar in College Teaching (**both face-to-face and online**)
 Improving Elementary School Science Instruction
 Measurement and Evaluation in STEM Education
 History and Philosophy of Science for Teachers
 Seminar on Science Instruction
 Seminar on Science Curriculums (**both online and face-to-face**)
 Technology for Science Teaching
 Research Analysis I & II
 Doctoral Seminar in Science Education (**both online and face-to-face**)
 Introduction to Curriculum Instruction and Science of Learning
 Guided Experiential Learning in College Teaching (online)

University of Prince Edward Island, Canada

Curriculum and Instruction in the Elementary Grades
 Secondary Science Methods I & II
 Measurement and Evaluation
 Issues in Teaching and School Experience
 Alternatives in Teaching and School Experiences
 Introduction to Educational Research Methods
 Quantitative Research Methods
 Research in Science Education Graduate Seminar

St. Francis Xavier University, Canada

Curriculum and Instruction in Elementary School Science
 Curriculum and Instruction in Secondary School Science
 Curriculum and Instruction in Integrated Mathematics and Science
 Psycho-Educational Assessments
 Research Methods

Service to the Profession

Program Director, Division of Research on Learning in Formal and Informal Settings (DRL),
Directorate of Education and Human Resources, National Science Foundation, Sept.
2020 – Aug. 2022

Chair, External Review Panel for the Master of Arts in STEM Education [MA(STEM Ed)] of the
Education University of Hong Kong, October, 2022

Grant proposal reviewer, Israel Science Foundation, April 2023

Grant proposal reviewer, University of Macau, 2017, 2019, 2020

Grant proposal reviewer, National Center of Science and Technology Evaluation, Ministry of
Education and Science, Almaty, Republic of Kazakhstan. Nov. 2017.; March 2023

Strand 10 program co-chair, the National Association for Research in Science Teaching
(NARST) annual conference, 2008-2010

SIG-Science Teaching and Learning program chair, the American Association of Educational
Research (AERA) annual conference, 2006-2008

Member, *Journal of Research in Science Teaching* outstanding paper's award committee, 2007-
2010.

Member, Outstanding Paper's Award Committee, National Association for Research in Science
Teaching, 2003 – 2006

Commissioned Researcher, A study of teachers' workload, Prince Edward Island Teachers'
Federation, 2002

Commissioned Trainer, Research Methods, Department of Veteran's Affairs of Canada, 2002

External reviewer for tenure and promotion for the following institutions:

Hunter College (2003)

Lakehead University (Canada) (2004)

Buffalo State College (2006, 2007, 2008, 2010, 2023)

University of Macau (China) (2010)

Worcester Polytechnic University (2009)

Nanyang Technical University (Singapore) (2010)

Educational Testing Services (2012, 2020)

State University of New York at Albany (2013)

University of Akron (2013)

University of Southern California (2013)

University of Louisville (2013)

Georgia State University (2014)

Iowa State University (2014)

Bowling Green State University (2014)

America University in Cairo (2015)
Penn State University, College Park (2015, 2018)
Arizona State University (2019)
University of Illinois at Chicago (2020)
Drexel University (2020)
University of Wyoming (2020)
University of Central Florida (2021)
Texas Tech University (2021)
University of Macau (2022)
Weizmann Institute of Science (2022)
Hong Kong Education University (2022)
Texas A&M University (2023)
Wright State University (2023)

PhD Dissertation External Examiner

Implementation of chemistry curriculum by teachers: From curriculum materials to teaching practices, University of Macau, May 30, 2014.

Assessment literacy of selected year 5 science teachers. University of Malaya, May 28, 2012.

A study of educational equity of Macao basic education through analyses of PISA2006 scientific literacy survey data. University of Macau, April 25, 2012

Characterizing physics students' conceptual systems of force and motion using Thagard's model, University of Manitoba, Canada, Feb. 2002.

A study on how students conceptualize links between basic Newtonian concepts -- a phenomenographic perspective. University of Cape Town, South Africa, March 2002

Master Thesis External Examiner

A study on the effect of student motivation on conceptual change in science. Guangxi Normal University, 2000

Origins of students' conceptions on selective chemical concepts, Guangxi Normal University, 1997

Journal Reviewer

Journal of Educational Computing Research, 2003

Journal of Research in Science Teaching, 1999-present

International Journal of Science Education, 1992 – 1997, 2008-2009, 2011-present

Science Education, 2004-present

Journal of Chemical Education, 2005-present

Journal of Science Education and Technology, 2002-present

Book and Journal Proposal Reviewer for the following publishers Springer, 2013, 2014, 2015

Corwin Press, 2002
Prentice Hall Canada, 2000 Taylor & Francis, 2019
Springer, 2019, 2020
Routledge, 2018, 2019, 2020

Conference Proposal Reviewer

The National Association for Research in Science Teaching, 1997, 2002 The American Educational Research Association, 1998, 2005
The 8th International Organization for Science and Technology Education (IOSTE) Symposium, 1995

Service to the University

Director, Center for Educational Innovation, State University of New York at Buffalo, July 2014 – Jan. 2018

Committee Member, Ad Hoc Committee for Distinguished Postdoc Mentoring Award Selection, State University of New York at Buffalo, Fall 2022

Co-Chair, Educational Technology Infrastructure subcommittee, University at Buffalo, State University of New York, 2015-2016

Committee Member, Institutional Standing Committee on Assessment, University at Buffalo, State University of New York. 2012-2014.

Faculty Senate, State University of New York at Buffalo, 2003-2005, 2007-2009

Chair, University Senate Committee on Research, University of Prince Edward Island, 2000-2001

University Senate Committee on Research, University of Prince Edward Island, 1998-2000

University Educational Information and Technology Committee, St. Francis Xavier University, 1995-1997

University Advisory Committee to the Director of the Coady International Institute, St. Francis Xavier University, 1996-1998

Faculty Association Salary and Benefit Committee, St. Francis Xavier University, 1995-1997

Service to the College/School

Associate Dean for Interdisciplinary Research, Graduate School of Education, University at Buffalo, State University of New York, 2014-2015

Graduate School of Education Personnel Committee, State University of New York at Buffalo, 2012-2013, 2019-2020, 2022-2024

Graduate School of Education Executive Committee, State University of New York at Buffalo, 2005-2008

Chair, Degrees Committee, Graduate School of Education, State University of New York at Buffalo, 2005-2006

Degrees Committee, Graduate School of Education, State University of New York at Buffalo, 2003-2005, 2009-2012

Coordinator, Faculty of Education Research Committee, University of Prince Edward Island, 1999-2000

Service to the Department

Interim Chair, Department of Learning and Instruction, State University of New York at Buffalo, July 2010 – Dec. 2010

Program Coordinator, Advanced Graduate Certificate in College Teaching, University at Buffalo, 2018-2020

Program Coordinator, EdM in Science and the Public, State University of New York at Buffalo, 2006 – 2016, 2018-2020

Interim Chair, Department of Learning and Instruction, State University of New York at Buffalo, July 2010 – Dec. 2010

Chair, Department Doctoral Studies Committee, State University of New York at Buffalo, 2005-2008

Department Doctoral Studies Committee, State University of New York at Buffalo, 2004-2005

Program Director, Science Education Programs, State University of New York at Buffalo, 2004-2008, 2009-2010

Chair, Education Department Research Ethics Review Committee, St. Francis Xavier University, 1997 - 1998

Coordinator, Research and Technology, St. Francis Xavier University, 1996- 1998

Founding Director, Center for Educational Research in Diverse Cultures, St. Francis Xavier University, 1996 - 1997

International Education Committee, St. Francis Xavier University, 1995 - 1997 Graduate Studies Committee, St. Francis Xavier University, 1994-1996 Faculty Evaluation Committee, St. Francis Xavier University, 1997-1998

Education Department Hiring Committee, St. Francis Xavier University, 1994-1997

Service: Paid Consulting

External Advisory Committee member, NJ Alliance for Clinical and Translational Science. Rutgers, State University of New Jersey. 2020

International Advisor, International Center for Science Education Research, Beijing Normal University, Nov. 2018 – 2020.

Advisory Board Member: China National Monitoring Center for Basic Education. Aug. 2015 – 2020

Advisory Board Member, NSF Funded Project: Geological models for Exploration of Dynamic Earth (GEODE). Concord Consortium/Penn State University (PI: Amy Pallant). July, 2017 – June, 2020

Advisory Board Member, NSF Funded Project: Designing Assessments in Physical Science for the Next Generation Science Standards (PI: James W. Pellegrino, University of Illinois at Chicago), July 2013 – June 2017

External Project Evaluator (NSF funded), Investigating how to enhance scientific argumentation through automated feedback in the context of two high school earth science curriculum units (PI: Lydia Liu, Educational Testing Service), Aug. 2015 – Aug. 2018

External Project Evaluator (NSF funded), Genesee Community College, 2013-2015

External Project Evaluator (DOE funded), Highland Falls-Fort Montgomery Central School District, New York, 2013

Advisory Board Member, NSF Funded Project: Designing Transformative Assessments for Interdisciplinary Learning in Science (DeTAILS) (PI, Dr. Ji Shen), University of Georgia, 2011- 2013

MVT (I) and (II) Projects, Learning Sciences Lab, Nanyang Technological University, Singapore, Jan., 2011.

Developing curriculum materials for the Human Anatomy and Physiology course (funded by NSF, PI, Dr. Ellen Lehning, Jamestown Community College). 2007-2009, Pedagogical and assessment consultant.

Grant proposal review panelist, US Department of Education, 2012, 2013, 2014

Grant proposal review panelist, The National Science Foundation, 2005, 2006, 2008, 2012, 2013, 2014, 2015

Grant Proposal Reviewer, Social Sciences and Humanities Research Council of Canada, 2003-2006, 2008

Grant Proposal Reviewer, National Research Foundation in South Africa, 2008 Grant Proposal Reviewer, Hong Kong University Grants Committee, 2006 Grant Proposal Reviewer, University of Macau, 2014

Methodology Consultant, Prince Edward Island Work Load Study, 2001-2002

Designed survey instruments and conducted statistical analysis (including Structural Equation Modeling using AMOS).

The science textbook series, RenAi Educational Research Institute, Beijing, P. R. China 2001 – 2002

Designed conceptual framework for the elementary and junior high school science textbooks.

Educational Statistician, Atlantic Evaluation Group, 2001 – 2002 Conducted on Discriminant analysis for the PEI labor market study.

Chinese National Research Institute for Science Popularization, 1997 – 2000 Provided advice on designing survey instrument and statistical analysis.

Guangxi Normal University, P. R. China, 1992 –1996 Provided advice on designing science teaching experiments and statistical analysis.

Service to Community

Co-Chair, PEI Provincial Science Fair, 2001- 2002 Coordinator, PEI Grade 10 Science Olympics, 1998-2002

Board member, PEI Multi-cultural Council, 1999 – 2002 President, Chinese Canadian Association of PEI, 1999 – 2001

Coordinator, School-University Collaborative Professional Development, West Pictou District High School, N. S. 1997

Coordinator, Northeastern N. S. Science Teachers' Network, 1997