Supplemental Material CBE—Life Sciences Education

Rowland et al.

Supplementary Information Table of Contents

Item	Pgs.
Appendix 1: Complete List of Reviewed Literature	2-10
Link to Google Sheet containing Supplemental Tables	11
Supplemental Table 1	12-13
Supplemental Table 2	14-16
Supplemental Table 3	17-22

APPENDIX 1: Complete List of Reviewed Literature.

- 1. Abu-Shakra, A., & Saliim, E. (2012). Including a service learning educational research project in a biology course-I: Assessing community awareness of childhood lead poisoning. *European Journal of Educational Research*, 1(3), 241–253.
- Alexander, P. A., Jetton, T. L., & Kulikowich, J. M. (1995). Interrelationship of knowledge, interest, and recall: Assessing a model of domain learning. *Journal of Educational Psychology*, 87(4), 559–575.
- Asraoui, J. F., Sayar, N. P., Knio, K. M., & Smith, C. A. (2008). Fly diversity revealed by PCR-RFLP of mitochondrial DNA. *Biochemistry and Molecular Biology Education*, 36(5), 354–362.
- Badotti, F., Barbosa, A. S., Reis, A. L. M., do Valle, Í. F., Ambrósio, L., & Bitar, M. (2014). Comparative modeling of proteins: A method for engaging students' interest in bioinformatics tools. *Biochemistry and Molecular Biology Education*, 42(1), 68–78.
- Badri, M., Yang, G., Al Mazroui, K., Mohaidat, J., Al Rashedi, A., & Al Housani, N. (2017). Out-of-school experience categories influencing interest in biology of secondary school students by gender: exploration on an Abu Dhabi sample. *Journal of Biological Education*, 51(2), 166–185.
- Baram-Tsabari, A., Sethi, R. J., Bry, L., & Yarden, A. (2010). Identifying students' interests in biology using a decade of self-generated questions. *Eurasia Journal of Mathematics, Science and Technology Education*, 6(1), 63–75.
- Baram- Tsabari, A., & Yarden, A. (2007). Interest in Biology: A developmental shift characterized using self- generated questions article. *American Biology Teacher*, 69(9), 532–540.
- Baram- Tsabari, A., & Yarden, A. (2008). Girls' biology, boys' physics: evidence from free- choice science learning settings. *Research in Science & Technological Education*, 26(1), 75–92.
- 9. Baram-Tsabari, A., & Yarden, A. (2011). Quantifying the gender gap in science interests. *International Journal of Science and Mathematics Education*, 9(3), 523–550.
- 10. Barnes, G., McInerney, D. M., & Marsh, H. W. (2005). Exploring sex differences in science enrolment intentions: An application of the General Model of Academic Choice. *The Australian Educational Researcher*, *32*(2), 1–23.
- Beigman Klebanov, B., Burstein, J., Harackiewicz, J. M., Priniski, S. J., & Mulholland, M. (2017). Reflective writing about the utility value of science as a tool for increasing STEM motivation and retention – Can AI help scale up? *International Journal of Artificial Intelligence in Education*, 27(4), 791–818.
- 12. Bockholt, S. M., West, J. P., & Bollenbacher, W. E. (2003). Cancer cell biology: A student-centered instructional module exploring the use of multimedia to enrich interactive, constructivist learning of science. *Cell Biology Education*, *2*(1), 35–50.
- Bonser, S. P., de Permentier, P., Green, J., Velan, G. M., Adam, P., & Kumar, R. K. (2013). Engaging students by emphasising botanical concepts over techniques: innovative practical exercises using virtual microscopy. *Journal of Biological Education*, 47(2), 123–127.
- Brame, C. J., Pruitt, W. M., & Robinson, L. C. (2008). A molecular genetics laboratory course applying bioinformatics and cell biology in the context of original research. *CBE—Life Sciences Education*, 7(4), 410–421.

- 15. Cakmakci, G., Sevindik, H., Pektas, M., Uysal, A., Kole, F., & Kavak, G. (2012). Investigating turkish primary school students' interest in science by using their selfgenerated questions. *Research in Science Education*, *42*(3), 469–489.
- 16. Çetin, G. (2014). Prospective teachers' views about video-enhanced general biology instruction. *Educational Research and Reviews*, 9(22), 1182–1199.
- 17. Chan, Y. M., Hom, W., & Montclare, J. K. (2011). Implementing and evaluating mentored chemistry-biology technology lab modules to promote early interest in science. *Journal of Chemical Education*, 88(6), 751–754.
- 18. Chittum, J. R., McConnell, K. D., & Sible, J. (2017). SCALE (ing)-UP teaching: A case study of student motivation in an undergraduate course. *Journal on Excellence in College Teaching*, *28*(3), 119–157.
- 19. Çimer, A. (2012). What makes biology learning difficult and effective: Students' views. *Educational Research and Reviews*, 7(3), 61–71.
- 20. Colicchia, G., Waltner, C., Hopf, M., & Wiesner, H. (2009). The scallop's eye—a concave mirror in the context of biology. *Physics Education*, 44(2), 175–179.
- Cook, M., & Mulvihill, T. M. (2008). Examining US college students' attitudes towards science: Learning from non-science majors. *Educational Research and Review*, 3(1), 38– 47.
- Cresswell, S. L., & Loughlin, W. A. (2017). A case-based scenario with interdisciplinary guided-inquiry in chemistry and biology: Experiences of first year forensic science students. *Journal of Chemical Education*, 94(8), 1074–1082.
- 23. da Silva, K. B. (2008). Biology and Society: A new way to teach tertiary science to non-science students. *Bioscience Education*, *12*(1), 1–5.
- 24. Daba, T. M., Anbassa, B., Oda, B. K., & Degefa, I. (2016). Status of biology laboratory and practical activities in some selected secondary and preparatory schools of Borena Zone, south Ethiopia. *Educational Research and Reviews*, *11*(17), 1709–1718.
- 25. Demchik, M. J. (1989). Investigating a population of Dandelions on a school lawn. *The American Biology Teacher*, *51*(4), 236–238.
- 26. Dohn, N. B. (2011). Situational interest of high school students who visit an aquarium. *Science Education*, *95*(2), 337–357.
- Dohn, N. B. (2013). Upper secondary students' situational interest: A case study of the role of a zoo visit in a biology class. *International Journal of Science Education*, 35(16), 2732–2751.
- Dohn, N. B., & Dohn, N. B. (2017). Integrating Facebook in upper secondary biology instruction: A case study of students' situational interest and participation in learning communication. *Research in Science Education*, 47(6), 1305–1329.
- 29. Durik, A. M., & Matarazzo, K. L. (2009). Revved up or turned off? How domain knowledge changes the relationship between perceived task complexity and task interest. *Learning and Individual Differences*, *19*(1), 155–159.
- 30. Erten, S. (2008). Interests of 5th through 10th grade students toward human biology. *H. U. Journal of Education*, *35*(1992), 135–147.
- 31. Evans, M. A., Jones, B. D., & Akalin, S. (2017). Using video game design to motivate students. *Afterschool Matters*, (26), 18–26.
- 32. Fortner, R. W. (1998). Sea grant: Enhancing K-12 education. Current, 15(1), 8-13.

- France, B., & Bay, J. L. (2010). Questions studentsask: Bridging the gap between scientists and students in a research institute classroom. *International Journal of Science Education*, 32(2), 173–194.
- Frazier, W. (2006). Magnifying students' interest in science. Science Scope, 29(8), 32– 35.
- 35. Gafoor, A. K., & Narayan, S. (2012). Out-of-school experience categories influencing interest in science of upper primary students by gender and locale: Exploration on an Indian sample. *Science Education International*, 23(3), 191–204.
- 36. Gardner, P. L., & Tamir, P. (1989a). Interest in biology. Part I: A multidimensional construct. *Journal of Research in Science Teaching*, *26*(5), 409–423.
- 37. Gardner, P. L., & Tamir, P. (1989b). Interest in biology. Part II: Relationship with the enrollment intentions of israeli senior high school biology students. *Journal of Research in Science Teaching*, *26*(5), 425–433.
- Glowinski, I., & Bayrhuber, H. (2011). Student labs on a university campus as a type of out-of-school learning environment: Assessing the potential to promote students' interest in science. *International Journal of Environmental and Science Education*, 6(4), 371– 392.
- 39. Green, S., & Smith, J. (2005). Small things draw big interest. *Science and Children*, 42(4), 30–34.
- Hagay, G., & Baram-Tsabari, A. (2011). A shadow curriculum: Incorporating students' interests into the formal biology curriculum. *Research in Science Education*, 41(5), 611– 634.
- Hagay, G., & Baram-Tsabari, A. (2012). Including Students' Voices as Engagement With Curriculum: Perspectives From a Secondary Biology Course. *Canadian Journal of Science, Mathematics and Technology Education*, 12(2), 160–177.
- 42. Hagay, G., & Baram-Tsabari, A. (2015). A strategy for incorporating students' interests into the high-school science classroom. *Journal of Research in Science Teaching*, *52*(7), 949–978.
- 43. Hagay, G., Baram-Tsabari, A., Ametller, J., Cakmakci, G., Lopes, B., Moreira, A., & Pedrosa-de-Jesus, H. (2013). The Generalizability of Students' Interests in Biology Across Gender, Country and Religion. *Research in Science Education*, *43*(3), 895–919.
- 44. Hagay, G., Baram-Tsabari, A., & Peleg, R. (2013). The Co-Authored Curriculum: High-School Teachers' Reasons for Including Students' Extra-Curricular Interests in Their Teaching. *International Journal of Science and Mathematics Education*, 11(2), 407–431.
- Hagay, G., Peleg, R., Laslo, E., & Baram-Tsabari, A. (2013). Nature or nurture? A lesson incorporating students' interests in a high-school biology class. *Journal of Biological Education*, 47(2), 117–122.
- 46. Halpin, M. J., Hoeffler, L., & Schwartz-Bloom, R. D. (2005). Piquing student interest with pharmacology. *Science Teacher*, 72(8), 48–51.
- 47. Harrison, M., Dunbar, D., Ratmansky, L., Boyd, K., & Lopatto, D. (2011). Classroombased science research at the introductory level: Changes in career choices and attitude. *CBE—Life Sciences Education*, 10(3), 279–286.
- Hartwell, M., & Kaplan, A. (2018). Students' personal connection with science: Investigating the multidimensional phenomenological structure of self-relevance. *The Journal of Experimental Education*, 86(1), 86–104.

- 49. Harvey, P. A., Wall, C., Luckey, S. W., Langer, S., & Leinwand, L. A. (2014). The python project: A unique model for extending research opportunities to undergraduate students. *CBE—Life Sciences Education*, *13*(4), 698–710.
- 50. Hazari, B. Z., Sadler, P. M., & Sonnert, G. (2013). The science identity of college students: Exploring the intersection of gender, race, and ethnicity. *Journal of College Science Teaching*, 42(5), 82–91.
- 51. Heddy, B. C., & Sinatra, G. M. (2017). Transformative parents: Facilitating transformative experiences and interest with a parent involvement intervention. *Science Education*, *101*(5), 765–786.
- 52. Heilbronner, N. N. (2013). The STEM pathway for women. *Gifted Child Quarterly*, *57*(1), 39–55.
- 53. Heldt, C. L., Bank, A., Turpeinen, D., & King, J. A. (2016). Translating university biosensor research to a high school laboratory experience. *Chemical Engineering Education*, 50(1), 70–75.
- 54. Hicks Pries, C., & Hughes, J. (2012). Inquiring into familiar objects: An inquiry-based approach to introduce scientific vocabulary. *Science Activities: Classroom Projects and Curriculum Ideas*, 49(2), 64–69.
- 55. Hoehn, R. (1988). Self-inflicted science projects. Science Activities, 25(1), 38-41.
- 56. Holstermann, N., Ainley, M., Grube, D., Roick, T., & Bögeholz, S. (2012). The specific relationship between disgust and interest: Relevance during biology class dissections and gender differences. *Learning and Instruction*, *22*(3), 185–192.
- 57. Holstermann, N., Grube, D., & Bögeholz, S. (2010). Hands-on activities and their influence on students' interest. *Research in Science Education*, 40(5), 743–757.
- Homer, M., & Ryder, J. (2015). The impact of a science qualification emphasising scientific literacy on post-compulsory science participation: An analysis using national data. *International Journal of Science Education*, 37(9), 1364–1380.
- Hong, J., Shim, K., & Chang, N. (1998). A study of Korean middle school students' interests in biology and their implications for biology education. *International Journal of Science Education*, 20(8), 989–999.
- Howard, D. R., & Miskowski, J. A. (2005). Using a module-based laboratory to incorporate inquiry into a large cell biology course. *Cell Biology Education*, 4(3), 249– 260.
- Hsu, P.-L., & Roth, W.-M. (2009). An analysis of teacher discourse that introduces real science activities to high school students. *Research in Science Education*, 39(4), 553– 574.
- 62. Hu, R., Chang, W.-H., & Lin, C.-Y. (2003). Science curriculum components favoured by high school students in Taiwan. *Journal of Biological Education*, *37*(4), 171–175.
- 63. Jervis, L., Jervis, L. M., & Giovannelli, D. (2005). Aligning biochemistry to the interests of biology students using Haloperoxidase to illustrate reactions of environmental and biomedical importance. *Biochemistry and Molecular Biology Education*.
- 64. Jones, M. G., Minogue, J., Oppewal, T., Cook, M. P., & Broadwell, B. (2006). Visualizing without vision at the microscale: Students with visual impairments explore cells with touch. *Journal of Science Education and Technology*, 15(5–6), 345–351.
- 65. Katz, L. A., Aloisio, K. M., Horton, N. J., Ly, M., Pruss, S., Queeney, K., ... DiBartolo, P. M. (2017). A program aimed toward inclusive excellence for underrepresented undergraduate women in the sciences. *CBE—Life Sciences Education*, 16(1), ar11.

- 66. Kelly, A. (1988). The customer is always right...Girls' and boys' reactions to science lessons. *The School Science Review*, *69*(249), 662–676.
- 67. Kelly, J. (1998). Epidemic village. Science Activities: Classroom Projects and Curriculum Ideas, 35(1), 17–22.
- 68. Kidman, G. (2009). Attitudes and interests towards biotechnology: the mismatch between students and teachers. *Eurasia Journal of Mathematics, Science and Technology Education*, *5*(2), 135–143.
- 69. Kışoğlu, M. (2018). An examination of science high school students' motivation towards learning biology and their attitude towards biology lesson. *International Journal of Higher Education*, 7(1), 151–164.
- 70. Kitchen, E., Reeve, S., Bell, J. D., Sudweeks, R. R., & Bradshaw, W. S. (2007). The Development and Application of Affective Assessment in an Upper-Level Cell Biology Course. *Journal of Research in Science Teaching*, 44(8), 1057–1087.
- Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. *Journal of Biological Education*, 48(2), 105–112.
- 72. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. *CBE—Life Sciences EducationLife Sciences Education*, 9(Spring), 34–44.
- 73. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. *Journal of College Science Teaching*, 40(1), 41–47.
- 74. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. *Center for Educational Policy Studies Journal*, 7(2), 127–140.
- 75. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. *Literacy Research and Instruction*, *53*(4), 287–325.
- 76. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspiring an Interest in STEM. *IEEE Transactions on Education*, 58(1), 48–55.
- Leonard, W. (1989). A Comparison of Student Reactions to Biology Instruction by Interactive Videodisc or Conventional Laboratory. *Journal of Research in Science Teaching*, 26(2), 95–104.
- 78. Li, Y. (2009). Stimulate Students' Interest by Genetics Exordium Teaching. *International Education Studies*, *2*(2), 99–102.
- 79. Li, Y. (2011). On the Cultivation of Students' Interests in Biology Teaching. *International Education Studies*, *4*(2), 141–143.
- Linnenbrink-Garcia, L., Pugh, K. J., Koskey, K. L. K., & Stewart, V. C. (2012). Developing Conceptual Understanding of Natural Selection: The Role of Interest, Efficacy, and Basic Prior Knowledge. *The Journal of Experimental Education*, 80(1), 45– 68.
- Liu, N., & Neuhaus, B. (2014). Gender Inequality in Biology Classes in China and Its Effects on Students' Short-Term Outcomes. *International Journal of Science Education*, 36(10), 1531–1550.

- Luketic, C. D., & Dolan, E. L. (2013). Factors Influencing Student Perceptions of Highschool Science Laboratory Environments. *Learning Environments Research*, 16(1), 37– 47.
- 83. Mahanal, S., Zubaidah, S., Bahri, A., & Dinnurriya, M. S. (2016). Improving Students' Critical Thinking Skills Through Remap NHT in Biology Classroom. *Asia-Pacific Forum* on Science Learning and Teaching, 17(2), 1–20.
- 84. Mellen, J. (1988). Favorite Demostrations: A Macroscopic Demonstration of a Microscopic Phenomenon. *Journal of College Science Teaching*, 18(1), 64–67.
- Meyer, A., Meyer-Ahrens, I., & Wilde, M. (2013). The Beneficial Effects of Non-Received Choice: A Study on Intrinsic Motivation in Biology Education. *European Journal of Educational Research*, 2(4), 185–190.
- Monroe, M. C., Hall, S., & Li, C. J. (2016). Can climate change enhance biology lessons? A quasi-experiment. *Applied Environmental Education & Communication*, 15(2), 125–137.
- Morvillo, N., & Brooks, J. G. (1995). Headline Science. *The Science Teacher*, 62(8), 20–23.
- Murray, L., Gibson, D., & Ward, A. (2008). Real-Time Ocean Data in the Classroom. Science Teacher, 75(7), 44–48.
- 89. Nadelson, L. S., Walters, L., & Waterman, J. (2010). Course-Integrated Undergraduate Research Experiences Structured at Different Levels of Inquiry. *Journal of STEM Education*, 11(1), 27–45.
- 90. Nastase, A. J., & Scharmann, L. C. (1991). Nonmajors' Biology: Enhanced Curricular Considerations. *The American Biology Teacher*, *53*(1), 31–36.
- 91. Nawani, J., Rixius, J., & Neuhaus, B. J. (2016). Influence of using challenging tasks in biology classrooms on students' cognitive knowledge structure: an empirical video study. *International Journal of Science Education*, *38*(12), 1882–1903.
- Nurachman, Z., Hermawan, J., Rachmayanti, Y., & Baradja, L. (2003). A Simple Way to Visualize Fibrinolysis in the Classroom. *Biochemistry and Molecular Biology Education*, 31(1), 16–19.
- 93. Nyberg, E., & Sanders, D. (2014). Drawing attention to the 'green side of life.' *Journal of Biological Education*, 48(3), 142–153.
- 94. Pai, A. (2009). Evolution in Action, a Case Study Based Advanced Biology Class at Spelman College. *The Journal of Effective Teaching*, 9(2), 54–68.
- 95. Paris, S. G., Yambor, K. M., & Packard, B. W. (1998). Hands-On Biology: A Museum-School-University Partnership for Enhancing Students' Interest and Learning in Science. *The Elementary School Journal*, 98(3), 267–288.
- 96. Peters, B. J., & Blair, A. C. (2013). Terrestrial Slugs as a Model Organism for Inquiry-Based Experimentation in a Majors General Biology Laboratory. *The American Biology Teacher*, 75(6), 408–411.
- 97. Prokop, P., Prokop, M., & Tunnicliffe, S. D. (2007). Is biology boring? Student attitudes toward biology. *Journal of Biological Education*, 42(1), 36–39.
- Prokop, P., Tuncer, G., & Chudá, J. (2007). Slovakian Students' Attitudes toward Biology. *Eurasia Journal of Mathematics, Science and Technology Education*, 3(4), 287– 295.

- 99. Rabgay, T. (2018). The Effect of Using Cooperative Learning Method on Tenth Grade Students' Learning Achievement and Attitude towards Biology. *International Journal of Instruction*, *11*(2), 265–280.
- 100. Randler, C., & Bogner, F. X. (2007). Pupils' Interest Before, During, and After a Curriculum Dealing With Ecological Topics and its Relationship. *Educational Research and Evaluation*, *13*(5), 463–478.
- 101. Randler, C., Osti, J., & Hummel, E. (2012). Decline in Interest in Biology among Elementary School Pupils During a Generation. *Eurasia Journal of Mathematics, Science and Technology Education*, 8(3), 201–205.
- 102. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engagement Using Observational Methods. *Educational Psychologist*, 50(1), 58–69.
- 103. Rios, A. C., & French, G. (2011). Introducing Bond-Line Organic Structures in High School Biology: An Activity That Incorporates Pleasant-Smelling Molecules. *Journal of Chemical Education*, 88(7), 954–959.
- 104. Ritchie, S. M., Tomas, L., & Tones, M. (2011). Writing Stories to Enhance Scientific Literacy. *International Journal of Science Education*, *33*(5), 685–707.
- 105. Robinson, M., & Ochs, G. T. (2008). Determining Why Students Take More Science Than Required in High School. *Bulletin of Science, Technology & Society*, 28(4), 338– 348.
- 106. Ryu, M. (2015). Understanding Korean Transnational Girls in High School Science Classes: Beyond the Model Minority Stereotype. *Science Education*, *99*(2), 350–377.
- 107. Sadler, T. D., Romine, W. L., Menon, D., Ferdig, R. E., & Annetta, L. (2015). Learning Biology Through Innovative Curricula: A Comparison of Game- and Nongame-Based Approaches. *Science Education*, *99*(4), 696–720.
- 108. Schanker, N. B. (1995). Biology Questionnaires: Grabbing Student Interest the First Week! *The American Biology Teacher*, 57(5), 286–287
- 109. Schiefele, U., & Csikszentmihalyi, M. (1994). Interest and the Quality of Experience in Classrooms. *European Journal of Psychology of Education*, 9(3), 251–270.
- 110. Sezen Vekli, G. (2013). Summer science camp for middle school students: A Turkish experience. *Asia-Pacific Forum on Science Learning and Teaching*, 14(1), 1–26.
- 111. Shook, A. C., Hazelkorn, M., & Lozano, E. R. (2011). Science Vocabulary for All. *Science Teacher*, 78(3), 45–49.
- 112. Sikes, S. S., & Schwartz-Bloom, R. D. (2009). Direction discovery. *Biochemistry and Molecular Biology Education*, *37*(2), 77–83.
- 113. Simon, U. K., Steindl, H., Larcher, N., Kulac, H., & Hotter, A. (2016). Young science journalism: writing popular scientific articles may contribute to an increase of highschool students' interest in the natural sciences. *International Journal of Science Education*, 38(5), 814–841.
- 114. Sinclair, T. R., & Johnson, M. R. (1996). Hands-On, Low-Cost Laboratory Exercises for Middle and High School Biology Classes. *Journal of Natural Resources and Life Sciences Education*, 25(2), 109–110.
- 115. Slater, T. F. (2006). Capturing Student Interest in Astrobiology Through Dilemmas and Paradoxes. *Journal of College Science Teaching*, *35*(6), 42–45.
- 116. Smith, P. S., Torsiglieri, J. A., Keith Esch, R., & Pasley, J. D. (2017). When 'we wish they knew' meets 'I want to know.' *International Journal of Science Education*, *39*(13), 1830–1845.

- 117. Staziński, W. (1988). Biological competitions and Biological Olympiads as a means of developing students' interest in biology. *International Journal of Science Education*, 10(2), 171–177.
- 118. Stencel, J. (1989). Cadavers Can Be Useful in Teaching Anatomy in College. *Journal of College Science Teaching*, 18(4), 242–245.
- 119. Strgar, J. (2007). Increasing the interest of students in plants. *Journal of Biological Education*, 42(1), 19–23.
- 120. Sumter, T. F., & Owens, P. M. (2011). An approach to teaching general chemistry II that highlights the interdisciplinary nature of science. *Biochemistry and Molecular Biology Education*, *39*(2), 110–116.
- 121. Sweeney, J. K., & Villarejo, M. (2013). Influence of an Academic Intervention Program on Minority Student Career Choice. *Journal of College Student Development*, *54*(5), 534–540.
- 122. Taber, K. (1991). Gender Differences in Science Preferences on Starting Secondary School. *Research in Science & Technology Education*, 9(2), 245–251.
- 123. Takemura, M., & Kurabayashi, M. (2014). Using analogy role-play activity in an undergraduate biology classroom to show central dogma revision. *Biochemistry and Molecular Biology Education*, 42(4), 351–356.
- 124. Tamir, P., & Gardner, P. (1989). The Structure of Interest in High School Biology. *Research in Science & Technological Education*, 7(2), 113–140.
- 125. Travis, H., & Lord, T. (2004). Traditional and Constructivist Teaching Techniques: Comparing Two Groups of Undergraduate Nonscience Majors in a Biology Lab. *Journal of College Science Teaching*, *34*(3), 12–18.
- 126. Tsui, C.-Y., & Treagust, D. F. (2003). Genetics Reasoning with Multiple External Representations. *Research in Science Education*, *33*, 111–135.
- 127. Udeani, U. N., Atagana, H. I., & Esiobu, G. O. (2016). The Implementation of Action Research for the Improvement of Biology Teaching and Learning in Senior Secondary Schools in Nigeria. *Journal of Education and Practice*, *7*(7), 57–69.
- 128. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs explaining upper-secondary school students' orientation towards biology-related careers. *International Journal of Science and Mathematics Education*, *12*(6), 1425–1444.
- 129. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2006). Students' interest in biology and their out-of-school experiences. *Journal of Biological Education*, 40(3), 124–129.
- 130. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The Importance of Pupils' Interests and Out-of-School Experiences in Planning Biology Lessons. *Science Education Review*, 7(1), 23–27.
- 131. Van Horne, K., & Bell, P. (2017). Youth disciplinary identification during participation in contemporary project-based science investigations in school. *Journal of the Learning Sciences*, *26*(3), 437–476.
- 132. Vaughan, I., Larsen, S., Durance, I., & Ormerod, S. (2011). Student-centred experiments with stream invertebrates. *Journal of Biological Education*, 45(2), 106–111.
- 133. Walter, C., & Walter, P. (2018). Is critical thinking a mediator variable of student performance in school? *Educational Research Quarterly*, *41.3*, 4–23.
- 134. White, H. (2007). Problem based learning The eyes have it. *Biochemistry and Molecular Biology Education*, *35*(3), 213–218.

- 135. Wiens, D. J., Depping, D. J., Wallerich, S. R., Van Laar, E. S., & Juhl, A. L. (2003). Gender matters. *Journal of College Science Teaching*, *33*(1), 32–36.
- 136. Wyss, V. L., & Tai, R. H. (2012). Service learning in high school biology and college major choice. *College Student Journal*, *46*(2), 459–464. Retrieved from
- 137. Yilmaz, M., & Demirhan, H. (2014). Variables predicting prospective biology teachers' acceptance perceptions regarding gene technology. *European Journal of Science and Mathematics Education*, 2(3), 183–192.
- 138. Zeeh, A., & Quell, A. (2015). A sweet dive into the gene pool. *The American Biology Teacher*, 77(2), 135–139.
- 139. Zimmerman, H. T., & McClain, L. R. (2016). Family learning outdoors: Guided participation on a nature walk. *Journal of Research in Science Teaching*, *53*(6), 919–942.

We would like to provide our supplemental materials as either CSV, Excel Workbook, or Google Sheet files that can be manipulated by the reader as described in the Conclusions section. Therefore, for the review process, we have provided both a link to a Google Sheet containing our supplemental tables in addition to the PDF copies of each table (appended). This linked Google Sheet is "view only" for review purposes, but can be copied and manipulated as a reader would. Please click the link below or paste the link into your browser to access the supplemental tables via Google Sheet.

https://docs.google.com/spreadsheets/d/10zl0b1EdaZvTrKBbUOlwzsnFqBm69FueIvjMjl xzw/edit?usp=sharing

The tables are also appended below. Because the appended tables are meant to be provided as a CSV, Workbook, or Google Sheet, the text on the files is very small. We recommend zooming in to view details.

Supplemental Table 1:

			0 1 D. 1 0 7 1		D : M = 4 = 3	
Foundational Publications	Hidi, S., & Renninger, K. A. (2006). The Four-Phase Model of Interest Development. Educational Psychologist, 41(2), 111–127. doi:10.1207/s15326985ep4102_4	Schiefele, U. (1991). Interest, Learning, and Motivation. Educational Psychologist, 26(3–4), 299–323. doi:10.1080/00461520.1991.9653136	Interest in biology. Part I: A multidimensional construct. Journal of	determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78.	Davis, M. S., & Csikszentmihalyi, M. (1977). Beyond Boredom and Anxiety: The Experience of Play in Work and Games. Contemporary Sociology, 6(2), 197. doi:10.2307/2065805	Others (cited by only one reviewed paper)
Cited Publications	Krapp and Prenzel 2011; Krapp 1998, 1000, 2000, 2002, 2005; Uidi	Schiefele 1991, 2001, 2009		doi:10.1037/0003-066X.55.1.68 Ryan & Deci, 2000; Deci, 1992	Csikszentmihalyi and Hermanson 1995 Bathunda & Cailagantmihalyi 1002	NA
	1999, 2000, 2002, 2005, Hidi, Renninger, and Krapp 2004; Hidi & Renninger, 2006; Renninger & Hidi, 2011; Hidi and Harackiewicz 2000; Krapp, Hidi, & Renninger, 1992; Hidi, 1990, 2006; Renninger, Hoffmann, & Krapp, 1998; Schraw, Flowerday, and Lehman 2001; Schraw and Lehman 2001; Rotgans and Schmidt, 2014 Rotgans & Schmidt, 2011 21		1985; Gardner 1998		Rathunde & Csikszentmihalyi, 1993	
Total Number of Papers Referencing Each Definition	21	6	4	4	2	14
 Badri, M., Yang, G., Al Mazroui, K., Mohaidat, J., Al Rashedi, A., & Al Housani, N. (2017). Out-of-school experience categories influencing interest in biology of secondary school students by gender: exploration on an Abu Dhabi 	1	0	0	0	0	1
sample. Journal of Biological Education, 51(2), 166-185.						
 Baram-Tsabari, A., & Yarden, A. (2007). Interest in Biology: A Developmental Shift Characterized Using Self- Generated Questions Article. <i>American Biology Teacher</i>, 69(9), 532–540. 	0	0	0	1	0	0
 Cakmakci, G., Sevindik, H., Pektas, M., Uysal, A., Kole, F., & Kavak, G. (2012). Investigating Turkish Primary School Students' Interest in Science by Using Their Self-Generated Questions. <i>Research in Science Education</i>, 42 (3), 	0	0	0	0	0	1
469–489. 18. Chittum, J. R., McConnell, K. D., & Sible, J. (2017). SCALE (ing)-UP Teaching: A Case Study of Student Motivation in an Undergraduate Course. <i>Journal on Excellence in College Teaching</i> , 28(3), 119–157.	0	0	0	0	0	1
 Dohn, N. B. (2011). Situational interest of high school students who visit an aquarium. <i>Science Education</i>, 95(2), 337–357. 	1	1	0	0	0	1
 Dohn, N. B. (2013). Upper Secondary Students' Situational Interest: A case study of the role of a zoo visit in a biology class. <i>International Journal of Science Education</i>, 35(16), 2732–2751. 	1	0	0	0	1	0
 Dohn, N. B., & Dohn, N. B. (2017). Integrating Facebook in Upper Secondary Biology Instruction: A Case Study of Students' Situational Interest and Participation in Learning Communication. <i>Research in Science Education</i>, 47(6), 1305–1329. 	1	1	0	0	0	0
 Erten, S. (2008). Interests of 5th Through 10th Grade Students Toward Human Biology. H. U. Journal of Education, 35 (1992), 135–147. 	1	0	0	0	0	1
 Gafoor, A. K., & Narayan, S. (2012). Out-of-school experience categories influencing interest in science of upper primary students by gender and locale: Exploration on an Indian sample. <i>Science Education International</i>, 23(3), 191–204. 	1	0	0	0	0	1
 Gardner, P. L., & Tamir, P. (1989a). Interest in biology. Part I: A multidimensional construct. <i>Journal of Research in Science Teaching</i>, 26(5), 409–423. 	0	0	1	0	0	1
 Gardner, P. L., & Tamir, P. (1989b). Interest in biology. Part II: Relationship with the enrollment intentions of israeli senior high school biology students. <i>Journal of Research in Science Teaching</i>, 26(5), 425–433. 	0	0	1	0	0	0
 Glowinski, I., & Bayrhuber, H. (2011). Student Labs on a University Campus as a Type of Out-of-School Learning Environment: Assessing the Potential to Promote Students' Interest in Science. <i>International Journal of Environmental and Science Education</i>, 6(4), 371–392. 	1	0	0	0	0	0
 Hagay, G., & Baram-Tsabari, A. (2011). A Shadow Curriculum: Incorporating Students' Interests into the Formal Biology Curriculum. <i>Research</i> in Science Education, 41(5), 611–634. 	0	0	0	1	0	0
 Hagay, G., & Baram-Tsabari, A. (2015). A strategy for incorporating students' interests into the high-school science classroom. <i>Journal of Research in</i> <i>Science Teaching</i>, 52(7), 949–978. 	0	0	0	0	0	0
 Hagay, G., Baram-Tsabari, A., Ametller, J., Cakmakci, G., Lopes, B., Moreira, A., & Pedrosa-de-Jesus, H. (2013). The Generalizability of Students' Interests in Biology Across Gender, Country and Religion. <i>Research in Science Education</i>, 43(3), 895–919. 	1	0	0	0	1	0
44. Hagay, G., Baram-Tsabari, A., & Peleg, R. (2013). The Co-Authored Curriculum: High-School Teachers' Reasons for Including Students' Extra- Curricular Interests in Their Teaching. <i>International Journal of Science and Mathematics Education</i> , 11(2), 407–431.	1	0	0	1	0	0

48. Hartwell, M., & Kaplan, A. (2018). Students' Personal Connection with	1	0	0	0	0	0
Science: Investigating the Multidimensional Phenomenological Structure of Self-						
Relevance. The Journal of Experimental Education, 86(1), 86-104.						
56. Holstermann, N., Ainley, M., Grube, D., Roick, T., & Bögeholz, S. (2012).	1	0	0	0	0	0
The Specific Relationship Between Disgust and Interest: Relevance During	-	- -	-	*	-	-
Biology Class Dissections and Gender Differences. Learning and Instruction,						
22(3), 185–192.						
 185–192. Holstermann, N., Grube, D., & Bögeholz, S. (2010). Hands-on Activities and 	1	1	0	0	0	0
	1	1	0	0	0	0
Their Influence on Students' Interest. Research in Science Education, 40(5),						
743–757.						
59. Hong, J., Shim, K., & Chang, N. (1998). A study of Korean middle school	0	0	1	0	0	1
students' interests in biology and their implications for biology education.						
International Journal of Science Education, 20(8), 989–999.						
69. Kışoğlu, M. (2018). An Examination of Science High School Students'	0	0	0	1	0	0
Motivation towards Learning Biology and Their Attitude Towards Biology						
Lesson. International Journal of Higher Education, 7(1), 151-164.						
70. Kitchen, E., Reeve, S., Bell, J. D., Sudweeks, R. R., & Bradshaw, W. S.	0	0	0	0	0	1
(2007). The Development and Application of Affective Assessment in an Upper-						
Level Cell Biology Course. Journal of Research in Science Teaching, 44(8),						
1057–1087.						
75. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary	1	0	0	0	0	0
Matrix and Academic Literacy Engagement of Ninth Grade Biology Students.	1	0	0	0	0	0
Literacy Research and Instruction, 53(4), 287–325.						
 Literacy Research and Instruction, 53 (4), 287–325. Li, Y. (2011). On the Cultivation of Students' Interests in Biology Teaching. 	0	0	0	0	0	
	0	0	0	0	0	1
International Education Studies, 4(2), 141–143.						
80. Linnenbrink-Garcia, L., Pugh, K. J., Koskey, K. L. K., & Stewart, V. C.	0	1	0	0	0	0
(2012). Developing Conceptual Understanding of Natural Selection: The Role of						
Interest, Efficacy, and Basic Prior Knowledge. The Journal of Experimental						
Education, 80(1), 45-68.						
81. Liu, N., & Neuhaus, B. (2014). Gender Inequality in Biology Classes in	1	0	0	0	0	1
China and Its Effects on Students' Short-Term Outcomes. International Journal						
of Science Education, 36(10), 1531-1550.						
91. Nawani, J., Rixius, J., & Neuhaus, B. J. (2016). Influence of using	1	0	0	0	0	0
challenging tasks in biology classrooms on students' cognitive knowledge			-			
structure: an empirical video study. International Journal of Science Education,						
38(12), 1882–1903.						
95. Paris, S. G., Yambor, K. M., & Packard, B. W. (1998). Hands-On Biology:	0	1	0	0	0	0
A Museum-School-University Partnership for Enhancing Students' Interest and	0	1	0	0	0	0
Learning in Science. The Elementary School Journal, 98(3), 267–288.						
 Randler, C., & Bogner, F. X. (2007). Pupils' Interest Before, During, and 	1	0	0	0	0	
	1	0	0	0	0	1
After a Curriculum Dealing With Ecological Topics and its Relationship.						
Educational Research and Evaluation, 13(5), 463–478.	Į					
102. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest	1	0	0	0	0	0
and Engagement Using Observational Methods. Educational Psychologist,						
50(1), 58-69.						
109. Schiefele, U., & Csikszentmihalyi, M. (1994). Interest and the Quality of	0	1	0	0	0	0
Experience in Classrooms. European Journal of Psychology of Education, 9(3),						
251-270.						
113. Simon, U. K., Steindl, H., Larcher, N., Kulac, H., & Hotter, A. (2016).	1	0	1	0	0	1
Young science journalism: writing popular scientific articles may contribute to	1			1	1	
an increase of high-school students' interest in the natural sciences. International						
Journal of Science Education, 38(5), 814–841.						
128. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs explaining upper	c 1	0	0	0	0	0
secondary school students' orientation towards biology-related careers.	1	0	°	×	ř.	× I
International Journal of Science and Mathematics Education, 12(6), 1425–1444.				1	1	
international Journal of Science and Mathematics Education, 12(0), 1425-1444.				1	1	
120 Litte A. Lucki K. Lemman, L. & Maisele, M. (2006). Co. L. C. S. S. S.	1	0	0	0	0	0
129. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2006). Students' interest in	1	U	0	0	0	0
biology and their out-of-school experiences. Journal of Biological Education,	1			1	1	
40(3), 124–129.	J			l	Į	
130. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The Importance of	1	0	0	0	0	0
Pupils' Interests and Out-of-School Experiences in Planning Biology Lessons.	1					
Science Education Review, 7(1), 23-27.				1	l	
137. Yilmaz, M., & Demirhan, H. (2014). Variables Predicting Prospective	0	0	0	0	0	1
Biology Teachers' Acceptance Perceptions Regarding Gene Technology.	1			1	1	
European Journal of Science and Mathematics Education, 2(3), 183–192.	1					
				•	•	

Supplemental Table 2:

Theory Name/Description	The Four-Phase Model of Interest Development	Person-Object Approach to Interest	Self-Determination Theory	Valence Beliefs	Expectancy-Value Theory	Flow Theory	John Dewey's View on Interest in Education	Others (cited by only one reviewed paper)
	Hidi, S., & Renninger, K. A. (2006). The Four-Phase Model of Interest Development. Educational Psychologist, 41(2), 111–127. doi:10.1207/s15326985ep4102_4	297–329. doi:10.17559/TV- 20150807194942	Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. American Psychologist, 55(1), 68–78. doi:10.1037/0003-066X.55.1.68	26(3-4), 299-323. doi:10.1080/00461520.1991.965 3136	Wigfield, A., & Eccles, J. S. (2000). Expectancy–Value Theory of Achievement Motivation. Contemporary Educational Psychology, 25(1), 68–81. doi:10.1006/ceps.1999.1015	Davis, M. S., & Csikszentmihalyi, M. (1977). Beyond Boredom and Anxiety: The Experience of Play in Work and Games. Contemporary Sociology, 6(2), 197. doi:10.2307/2065805	Dewey, J. (1913). Interest and Effort In Education (1913). Kessinger Publishing, LLC. doi:10.1037/14633-000	NA
Cited Publications	Hidi and Renninger, 2000, 2006; Hidi, 1990; Hidi, Renninger, and Krapp 2004; Hidi & Harackiewicz, 2000	Krapp 1999, 2000, 2002, 2005, 2007; Prenzel, Krapp and Schiefele (1986, 1989). Krapp & Prenzel 2011; Krapp, Hidi and Renninger, (1992)	Ryan and Deci, 1985, 1992, 2000. Deci, Vallerand, Pelletier, & Ryan, 1991; Deci & Ryan, 1993; Vallerand et al. 1992	Schiefele, 1991, 1996, 1998, 2001,2009. Schiefele & Krapp, 1996)	Wigfield & Eccles, 2000; Eccles et al. 1983; Eccles 2009; Pintrich et al 1993; Pintrich and Schunk 2002,		Dewey 1902, 1913	NA
Total Number of Papers Referencing the Theory	23	20	17	13	8	2	2	26
 Alexander, P. A., Jetton, T. L., & Kulikowich, J. M. (1995). Interrelationship of knowledge, interest, and recall: Assessing a model of domain learning. Journal of Educational Psychology, 87(4), 559–575. 	1	0	0	1	1	0	0	1
 Badri, M., Yang, G., Al Mazroui, K., Mohaidat, J., Al Rashedi, A., & Al Housani, N. (2017). Out-of-school experience categories influencing interest in biology of secondary school students by gender: exploration on an Abu Dhabi sample. Journal of Biological Education, 51(2), 166–185. 	1	2	0	0	0	0	0	0
 Baram-Tsabari, A., Sethi, R. J., Bry, L., & Yarden, A. (2010). Identifying Students' Interests in Biology Using a Decade of Self-Generated Questions. Eurasia Journal of Mathematics, Science and Technology Education, 6(1), 63–75. 	1	0	0	1	0	0	0	0
 Baram-Tsabari, A., & Yarden, A. (2007). Interest in Biology: A Developmental Shift Characterized Using Self- Generated Questions Article. American Biology Teacher, 69(9), 532–540. 	0	1	1	0	0	0	0	1
 Baram-Tsabari, A., & Yarden, A. (2008). Girls' biology, boys' physics: evidence from free-choice science learning settings. Research in Science & Technological Education, 26(1), 75–92. 	0	0	0	1	1	0	0	1
 Baram-Tsabari, A., & Yarden, A. (2011). Quantifying the Gender Gap in Science Interests. International Journal of Science and Mathematics Education, 9(3), 523–550. Barnes, G., McInerney, D. M., & Marsh, H. W. (2005). 	0	1	1	0	0	0	0	0
Exploring sex differences in science enrolment intentions: An application of the General Model of Academic Choice. <i>The Australian Educational Researcher</i> , 32(2), 1–23.	0	0	0	0	1	0	U	0
 Beigman Klebanov, B., Burstein, J., Harackiewicz, J. M., Priniski, S. J., & Mulholland, M. (2017). Reflective Writing About the Utility Value of Science as a Tool for Increasing STEM Motivation and Retention – Can AI Help Scale Up? International Journal of Artificial Intelligence in Education, 27(4), 791–818. 	0	0	0	0	1	0	0	0
 Cakmakci, G., Sevindik, H., Pektas, M., Uysal, A., Kole, F., & Kavak, G. (2012). Investigating Turkish Primary School Students' Interest in Science by Using Their Self-Generated Questions. <i>Research in Science Education</i>, 42(3), 469–489. 	1	1	0	0	0	0	0	1
 Chittum, J. R., McConnell, K. D., & Sible, J. (2017). SCALE (ing)-UP Teaching: A Case Study of Student Motivation in an Undergraduate Course. <i>Journal on Excellence in College Teaching</i>, 28(3), 119–157. 	1	0	1	0	1	0	0	1
 Dohn, N. B. (2011). Situational interest of high school students who visit an aquarium. <i>Science Education</i>, 95(2), 337–357. 	0	0	0	0	0	0	0	1
 Dohn, N. B. (2013). Upper Secondary Students' Situational Interest: A case study of the role of a zoo visit in a biology class. <i>International Journal of Science Education</i>, 35(16), 2732–2751. 	1	1	1	0	0	0	0	0
 Dohn, N. B., & Dohn, N. B. (2017). Integrating Facebook in Upper Secondary Biology Instruction: A Case Study of Students' Situational Interest and Participation in Learning Communication. Research in Science Education, 47(6), 1305–1329. 	1	1	1	0	0	0	0	0
 Durik, A. M., & Matarazzo, K. L. (2009). Revved up or turned off? How domain knowledge changes the relationship between perceived task complexity and task interest. <i>Learning and Individual Differences</i>, 19(1), 155–159. 	1	1	0	1	0	0	0	1
 Erten, S. (2008). Interests of 5th Through 10th Grade Students Toward Human Biology. <i>H. U. Journal of Education</i>, 35(1992), 135–147. 	0	1	0	0	0	0	0	0

31. Evans, M. A., Jones, B. D., & Akalin, S. (2017). Using	1	0	0	0	0	0	0	1
Video Game Design to Motivate Students. Afterschool Matters,	1							
(26), 18-26.	1							
33. France, B., & Bay, J. L. (2010). Questions Students Ask:	1	0	0	0	0	0	0	1
Bridging the gap between scientists and students in a research	1		-		-			
institute classroom. International Journal of Science Education,	1							
32(2), 173–194.	1							
 Gardner, P. L., & Tamir, P. (1989a). Interest in biology. Part 	0	0	0	0	0	0	0	1
I: A multidimensional construct. Journal of Research in Science	0	0	0	0	0	0	0	1
Teaching, 26(5), 409–423.	1							
 <i>Baching</i>, 20(5), 409–425. Glowinski, I., & Bayrhuber, H. (2011). Student Labs on a 	ł	1	1	0	0	0	0	,
	1	1	1	0	0	0	0	1
University Campus as a Type of Out-of-School Learning	1							
Environment: Assessing the Potential to Promote Students'	1							
Interest in Science. International Journal of Environmental and	1							
Science Education, 6(4), 371–392.	Į'							
40. Hagay, G., & Baram-Tsabari, A. (2011). A Shadow	0	0	1	0	0	0	1	0
Curriculum: Incorporating Students' Interests into the Formal	1							
Biology Curriculum. Research in Science Education, 41(5),	1							
611-634.								
41. Hagay, G., & Baram-Tsabari, A. (2012). Including	0	0	1	0	0	0	0	0
Students' Voices as Engagement With Curriculum: Perspectives	1							
From a Secondary Biology Course. Canadian Journal of	1							
Science, Mathematics and Technology Education, 12(2),	1							
160-177.	1							
42. Hagay, G., & Baram-Tsabari, A. (2015). A strategy for	0	0	1	0	0	0	0	0
incorporating students' interests into the high-school science	1					-		
classroom. Journal of Research in Science Teaching, 52(7),	1							
949–978	1							
 Hagay, G., Baram-Tsabari, A., Ametller, J., Cakmakci, G., 	h	1	1	0	1	1	0	1
Lopes, B., Moreira, A., & Pedrosa-de-Jesus, H. (2013). The	1		1	0	1	1	0	1
Generalizability of Students' Interests in Biology Across	1							
	1							
Gender, Country and Religion. Research in Science Education,	1							
43(3), 895–919.								
44. Hagay, G., Baram-Tsabari, A., & Peleg, R. (2013). The Co-	1	0	0	1	0	0	0	0
Authored Curriculum: High-School Teachers' Reasons for	1							
Including Students' Extra-Curricular Interests in Their Teaching.	1							
International Journal of Science and Mathematics Education,	1							
11(2), 407-431.								
45. Hagay, G., Peleg, R., Laslo, E., & Baram-Tsabari, A.	0	0	1	0	0	0	0	0
(2013). Nature or nurture? A lesson incorporating students'	1							
interests in a high-school biology class. Journal of Biological	1							
Education, 47(2), 117-122.	1							
48. Hartwell, M., & Kaplan, A. (2018). Students' Personal	0	0	1	0	1	0	0	0
Connection with Science: Investigating the Multidimensional	1							
Phenomenological Structure of Self-Relevance. The Journal of	1							
Experimental Education, 86(1), 86–104.	1							
 Heddy, B. C., & Sinatra, G. M. (2017). Transformative 	1	0	0	0	0	0	0	0
parents: Facilitating transformative experiences and interest with	-	0	•	0	•	0	0	0
a parent involvement intervention. Science Education, 101(5),	1							
765-786.	1							
 Figure 105–780. Heilbronner, N. N. (2013). The STEM Pathway for Women. 	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	1
Gifted Child Quarterly, 57(1), 39–55. 56. Holstermann, N., Ainley, M., Grube, D., Roick, T., &	l	1	0			0	0	1
 Holstermann, N., Ainley, M., Grube, D., Roick, I., & Bögeholz, S. (2012). The Specific Relationship Between Disgust 	1	1	U	1	1	U	v	1
	1							
and Interest: Relevance During Biology Class Dissections and	1							
Gender Differences. Learning and Instruction, 22(3), 185-192.	1							
	l	-	-	-			*	n
57. Holstermann, N., Grube, D., & Bögeholz, S. (2010). Hands-	0	1	0	1	0	0	0	0
on Activities and Their Influence on Students' Interest. Research	1							
in Science Education, 40(5), 743-757.	l'							
59. Hong, J., Shim, K., & Chang, N. (1998). A study of Korean	0	0	0	0	0	0	0	0
middle school students' interests in biology and their	1							
implications for biology education. International Journal of	1							
Science Education, 20(8), 989-999.	1							
69. Kışoğlu, M. (2018). An Examination of Science High	0	0	1	0	0	0	0	0
School Students' Motivation towards Learning Biology and	1							
Their Attitude Towards Biology Lesson. International Journal	1							
of Higher Education, 7(1), 151–164.	1							
 Kitchen, E., Reeve, S., Bell, J. D., Sudweeks, R. R., & 	0	1	0	1	0	0	0	0
Bradshaw, W. S. (2007). The Development and Application of	1-		-	-	-	-	-	-
Affective Assessment in an Upper-Level Cell Biology Course.	1							
Journal of Research in Science Teaching, 44(8), 1057–1087.	1							
The Kline of the K (2014) (Delegand of the King of the		1	0	0	0	0	0	0
71. Klingenberg, K. (2014). 'Primärerfahrung' with Living	0	1	0	0	U	0	U	U
Animals in Contrast to Educational Videos: A Comparative	1							
Intervention Study. Journal of Biological Education, 48(2),	1							
105-112.	L				1		L	

Workshow Workshow Result Image									
Cale Biology Statest Laway Statest	75. Larson, S. C. (2014). Exploring the Roles of the Generative	1	0	0	0	0	1	0	1
No. 10. 10. 10. 10. 10. 10. 10. 10. 10. 10									
Bit Internet Gerick L. Puck, K. J. Soles, K. L. K. J. I <tdi< td=""> I I</tdi<>	Grade Biology Students. Literacy Research and Instruction,								
Sterry, V. (201): Docsky: Company 1 Montanes, P(N) P <t< td=""><td>53(4), 287-325.</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	53(4), 287-325.								
Shard A Sector Tensor, at Times, at Times, at Times, at Times, and Times, and Sector Tensor, and a sector of times, at Time	80. Linnenbrink-Garcia, L., Pugh, K. J., Koskey, K. L. K., &	1	0	0	1	0	0	0	1
Scorebar Descention Control Contro Control Control	Stewart, V. C. (2012). Developing Conceptual Understanding of								
S-S. I	Natural Selection: The Role of Interest, Efficacy, and Basic Prior								
11. Lux, Na humber, D. (2014). Genetal bogolity in the Operation Shore Lancebox. 1 0	Knowledge. The Journal of Experimental Education, 80(1),								
blogs chosen a China and Is Effect action. <i>March S During March Market S During March Market S During Market </i>	45-68.								
Imm Outcome Anomal An	81. Liu, N., & Neuhaus, B. (2014). Gender Inequality in	1	0	0	0	0	0	0	1
International operations of the state is a base of the state is a ba	Biology Classes in China and Its Effects on Students' Short-								
Si Moyer, A. Lope-Atoma, I. & Wide, M. (201). The 0 0 1 0 0 1 Moretard, Hirse of None Resolved Disc. Solve International of Discipt Eduction. Encodemant of D	Term Outcomes. International Journal of Science Education,								
Interfactor	36(10), 1531-1550.								
Moderation Blooky Education. Encourse Anomaly of Blooky Education. Encourse Anomaly of Blooky Education. Encourse Anomaly Blooky Educ	85. Meyer, A., Meyer-Ahrens, I., & Wilde, M. (2013). The	0	0	1	0	0	0	0	1
Chanceman Records, 19(1), 183-190 Image	Beneficial Effects of Non-Received Choice: A Study on Intrinsic								
10. Normal, J. Kuiss, J. A. Naham, B. J. (2016). Influence of equivalence of the object discoscies of student's interpreter discosciscis of student's interpreter discoscies of student's i	Motivation in Biology Education. European Journal of								
uning dallayers Landle Long									
organice for higher structure in empirical video study. Structure in experimental video study. Structure in empirical vi	91. Nawani, J., Rixius, J., & Neuhaus, B. J. (2016). Influence of	0	1	0	1	0	0	0	1
Immensional Journal of Science Enfortation, 8(12), 1822–1903 Immensional Journal of Science Enfortation, 8(12), 1822–1903 Immensional Journal of Science Enformation (Solid Science Information (Solid Science	using challenging tasks in biology classrooms on students'								
Darks, S., Yunbor, K. M., & Packard, B. W. (1998). Image of Indicay: A Macure School-Unversity Patremphy Image of Indicay: A Macure School-Unversite Patremphy Image of Indicay	cognitive knowledge structure: an empirical video study.								
Hands On Biology - Masseums School-Linversity Purnership for Enhances (Subders, N. & Tunnellife, S. D. (207). I for Enhan	International Journal of Science Education, 38(12), 1882-1903.								
Hands Onlogy: A Mascurs School-Liversity Purpusching is Science. The second structure of Light Parkers, School Sourced, (SRL) 267-288. Image: Science Control of Co								1	
Dire Balances Stander Unterständ Stander Unte	95. Paris, S. G., Yambor, K. M., & Packard, B. W. (1998).	0	0	0	1	0	0	0	1
Elementary School Agental, 95(2), 257-28. Image: Constraint of the second biology. Journal of the second biology. J	Hands-On Biology: A Museum-School-University Partnership							1	
97. Plokop, P., Pkokop, M., & Tumichffe, S. D. (2007). Is 0 <td>for Enhancing Students' Interest and Learning in Science. The</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	for Enhancing Students' Interest and Learning in Science. The								
biology of proving? Student attitudes twardt biology. Journal of microsoft Biology of Decision of Discovery biology of Particle attitudes the approximation of the Construction of Discovery biology of Decision of the Construction of Discovery biology of Decision of the Construction of Discovery biology of Decision of Discovery biology of Discovery biolo	Elementary School Journal, 98(3), 267-288.								
Indiagend Education, 2(1), 35-39 Inclose Inclose <t< td=""><td>97. Prokop, P., Prokop, M., & Tunnicliffe, S. D. (2007). Is</td><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></t<>	97. Prokop, P., Prokop, M., & Tunnicliffe, S. D. (2007). Is	1	0	0	0	0	0	0	0
100. Rander, C., & Bogner, F. X. (2007). Fuglis Interest Echological Topics and its Relationship. Educational Recarch and Evaluation, 11(5), 463-478. 0 0 0 0 0 Echological Topics and its Relationship. Educational Recarch and Evaluation, 11(5), 463-478. 0 0 0 0 0 0 100. Randler, C. Oki, J., & Hummel, E. (2012). Decline in Interest in Biology and Eloneatrics, <i>Networe and</i> 0 0 0 0 0 0 0 200. Reaminger, K., A. & Bachraa, J. F. (2013). Studying Treedows Education, 8(3), 201-205. 0	biology boring? Student attitudes toward biology. Journal of								
Before, During, and After a Curriculum Dealing With Ecological Topics Licenstinal Research and Evolution, 15(5), 463–478. IOI. Randler, C., Osci, J. & Hummel, E. (2012). Decline in Interest in Biology anong Elementary School Pupils During a Generation. Jamual of Mathematics, Science and Technology Education, 8(3), 201–205. IOI. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engigement Using Observational Methods. Educational Psychologiet, 10(1), 58–60. IOI. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engigement Using Observational Methods. Education and of Mathematics, Science and Triggers for Interest and Engigement Using Observational Methods. Education of U), 58–60. IOI. School, J. Studying J. Interest and Interest in the Nature of Science and Interest and Engigement Using Observational Methods. Education of U), 58–60. IOI. School, J. Studying J. Interest and Interest in the Nature of Interest and Engigement Using Observational Methods. Education of U), 58–60. IOI. School, J. Studying J. Interest and Interest in the Nature of Interest and Engigement Using Observational Methods. Education of U), 58–60. IOI. School Interest and Intere	Biological Education, 42(1), 36-39.								
Ecological Topics and its Relationship. Educational Research and Evaluation, 15(1), 463–478. Image: C. Osti, J. & Hummel, E. (2012). Decline in Interest in Biology among Elementary School Pagis During a Generation. Eurosita Journal of Mathematics, Science and Tradeous Topics (S1), 201–205. Image: C. Osti, J. & Hummel, E. (2012). Decline in Interest in Biology and the interest in Classroomethaly, M. (1994). Interest and I Psychology of Education, 9(2), 21–270. Image: Display and Display	100. Randler, C., & Bogner, F. X. (2007). Pupils' Interest	0	1	0	0	0	0	0	0
and Evaluation, 13(5), 463–478. Image: Const. J. & Hummel, E. (2012). Decline in Interest in Biology among Elementary School Pupils During a Generation. <i>Lurusia Journal of Mathematics, Science and Technology: Education</i> , 8(1), 201–205. Image: Const. J. & Hummel, E. (2012). Studying Image: Const. J. & Const. J. & Hummel, Science and Technology: Education, 8(1), 201–205. Image: Const. J. & Hummel, M. (2004). Image:	Before, During, and After a Curriculum Dealing With								
101. Randler, C., Oxi, J., & Hummel, F. (2012). Decline in Interest in Biology mong Elementary School Pupils During a Generation. <i>Linxia Journal of Muthematics, Science and</i> 0 0 0 0 1 Interest in Biology mong Elementary School Pupils During a Generation. <i>Linxia Journal of Muthematics, Science and</i> 0 0 0 0 0 0 0 IC2. Renninger, K. A., Baschard, J. F. (2015). Studying Triggers for Interest and Engagement Using Observational Methods. <i>Lincational Psychology</i> , 5(1), 58-69. 0	Ecological Topics and its Relationship. Educational Research								
Interest in Biology among Elementary School Pupils During a constrained of the Quality of Experience in Classrooms. European Journal of Manhamiets, Scheve and Anne and Mathematics, Scheve and Mathematics, Scheve and Anne and Mathem	and Evaluation, 13(5), 463-478.								
Generation. Eurosia Journal of Mathematics, Science and Technology Education, 8(3), 201–205. URO Schulege, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engagement Using Observational Methods. Educational Psychologies, 50(1), 58–69. 109. Schulege, U., & Csikszentmibalyi, M. (1994). Interest and Psychology of Education, 9(3), 251–270. 113. Simon U. K., Steind, H., Lancher, N., Kuke, H., & Hotter, 113. Simon U. K., Steind, H., Lancher, N., Kuke, H., & Hotter, 123. Ution, A. (2014). Interest, and Electrificacy beliefs 0 123. Ution, A. (2014). Interest, and and effectificacy beliefs 123. Ution, A. (2014). Interest, and and effectificacy beliefs 0 212. Ution, A. (2016). Young science journalism: writing popular scientific Education, 12(6), 1425-1444. 123. Ution, A. (2016). VLOOB). 123. Ution, A. (2016). VLOOB). 120. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution, A., Juni, K., Lavonen, J., & Messalo, V. (2006). 130. Ution,	101. Randler, C., Osti, J., & Hummel, E. (2012). Decline in	1	0	1	0	0	0	0	1
Technology Education, 8(3), 201–205. Image: K. A., & Bachrach, J. E. (2015). Studying Image: K. E. (2016). Studying									
102. Reminger, K. A., & Bachrach, J. E. (2015). Studying 1 0 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>									
Triggers for Interest and Engagement Using Observational Image: Second Seco									
Methods. Educational Psychologist, 50(1), 58-69. Image: Section of Control of Section and Sectin and Sectin and Section and Section and Section and Sect		1	0	0	0	0	0	0	0
109. Schiefele, U., & Csikszentmihalyi, M. (1994). Interest and I 1 0 1									
he Quality of Experience in Classrooms. <i>European Journal of</i> <i>Psychology of Education</i> , 9(3), 251–270. 11. Simon, U. K., Steind, H., Larcher, N., Kulac, H., & Hotter, A. (2016). Young science journalism: writing popular scientific trites may contribute to an increase of high-school students' interest in the natural sciences. <i>International Journal of Science</i> <i>Education</i> , 38(5), 814–841. 128. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs polying science journalism: writing popular scientific <i>Education</i> , 12(6), 1425–1444. 129. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2006). Students' interest in the inology and their out-of-school experiences. <i>Journal of Biological Education</i> , 40(3), 124–129. 10. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J. & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K., Lavonen, J. & Meisalo, V. (2008). The 0 10. Uitto, M. Juuti, K.									
Psychology of Education, 9(3), 251–270. Image: Constraint of the state of th		1	1	0	1	0	0	1	1
113. Simon, U. K., Steindl, H., Larcher, N., Kulae, H., & Hotter, 0 1 1 0 0 0 0 0 A. (2016). Young science journalism: writing popular scientific articles may contribute to an increase of high-school students' interest in the natural sciences. International Journal of Science and Editorian, 38(5), 814–841. 0 0 0 0 0 0 1 128. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs 0 1 1 0 0 0 0 1 129. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs 0 1 1 0 0 0 0 0 0 0 129. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs 0 1 1 0 0 0 0 0 1 129. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs interest in biology and their out-of-school experiences. Journal of Science and Mathematics Education, 12(6), 1425–1444. 0									
A. (2016). Young science journalism: writing popular scientific articles may contribute to an increase of high-school students' interest in the natural sciences. International Journal of Science Education, 38(5), 814-841. Image: Science Sci									
articles may contribute to an increase of high-school students' interest in the natural sciences. International Journal of Science Education, 33(5), 814-841. 128. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs biology-related careers. International Journal of Science and Mathematics Education, 12(6), 1425-1444. 129. Uitto, A., Houris, L., & Artissiaho, V. (2006). 129. Uitto, A., Houris, L., & Meisaho, V. (2006). Students' interest in biology and their out-of-school experiences. 100. Uitto, A., Uniti, K., Lavonen, J., & Meisaho, V. (2006). 100. Uitto, A., Uniti, K., Lavonen, J., & Meisaho, V. (2006). 100. Uitto, A., Uniti, K., Lavonen, J., & Meisaho, V. (2006). 100. Uitto, A., Uniti, K., Lavonen, J., & Meisaho, V. (2006). 100. Uitto, A., Uniti, K., Lavonen, J., & Meisaho, V. (2006).		0	1	1	0	0	0	0	0
interest in the natural sciences. International Journal of Science Education, 38(5), 814–841. 128. Utito, A. (2014). Interest, attitudes and self-efficacy beliefs provide a science and Mathematics Education, 12(6), 1425–1444. 129. Utito, A., Juuti, K., Lavonen, J., & Meisalo, V. (2006). Students' interest in biology and their out-of-school experiences: Journal of Biological Education, 40(3), 124–129. 100. Utito, A., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 10 00 11 00 00 00 00 00 00 00 00 00 0									
Education, 38(5), 814-841. Image: Statustical and statustical an									
128. Uitto, A. (2014). Interest, attitudes and self-efficacy beliefs 0 1 1 0 0 0 0 1 explaining upper-secondary school students' orientation towards 1 1 0 0 0 0 1 1 usplaining upper-secondary school students' orientation towards 1 1 0 0 0 1 1 129. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2006). 1 2 0									
explaining upper-secondary school students' orientation towards biology-related careers. <i>International Journal of Science and Mathematics Education</i> , 12(6), 1425-1444.									
biology-related careers. International Journal of Science and Mathematics: Education, 12(6), 1425-1444. 129. Uitto, A., Juuit, K., Lavonen, J., & Meisalo, V. (2006). Students' interest in biology and their out-of-school experiences.			1	1	0	0	0	0	1
Mathematics Education, 12(6), 1425–1444. Image: Constraint of the state of t									
129. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2006). 1 2 0 0 0 0 0 0 0 Students' interest in biology and their out-of-school experiences. 0 0 0 0 0 0 0 0 0 0 1 Journal of Biological Education, 40(3), 124-129. 1 0 0 0 0 1									
Students' interest in biology and their out-of-school experiences. Students' interest in the school experiences. Students' interest in									
<i>Journal of Biological Education</i> , 40(3), 124–129. In Constant, 40(3), 124		1	2	0	0	0	0	0	0
130. Uitto, A., Juuti, K., Lavonen, J., & Meisalo, V. (2008). The 0 11 0 0 11 0 0 0 11									
						-		-	
		0	1	0	1	0	0	0	1
	Importance of Pupils' Interests and Out-of-School Experiences								
in Planning Biology Lessons. Science Education Review, 7(1),									
	23–27.	0	0	0		0	0		
	131. Van Horne, K., & Bell, P. (2017). Youth Disciplinary	U	0	U	U	U	U	0	1
	Identification During Participation in Contemporary Project-							1	
	Based Science Investigations in School. Journal of the Learning								
	Sciences, 26(3), 437–476.	*	*	-	4	*	÷.		
137. Yilmaz, M. & Demirhan, H. (2014). Variables Predicting 0 0 0 0 0 0 1		0	0	0	0	0	0	0	1
Prospective Biology Teachers' Acceptance Perceptions								1	
	Regarding Gene Technology. European Journal of Science and								
	Mathematics Education, 2(3), 183-192.								

Supplemental Table 3:

Reviewed Literature	Collecting qualitative data	Collecting quantitative data	Collecting both quantiative and qualitative data	Used existing questionnaire	Self-developed questionnaire	Origin of questionnaire if other than self	Single-item	Single- aspect	Multi-aspect	Multi- dimensional	Unknown	Interest- focused	Affect- focused	Want-to- learn only
Total Number of Papers Systematically Measuring Interest	22	49	22	27	48	26	25	21	19	4	7	24	10	12
 Abu-Shakra, A., & Saliim, E. (2012). Including a Service Learning Educational Research Project 	0	1	0	0	1	0	1	0	0	0	0	1	0	1
in a Biology Course-I: Assessing Community														
Awareness of Childhood Lead Poisoning. European Journal of Educational Research, 1(3),														
241-253.														
 Alexander, P. A., Jetton, T. L., & Kulikowich, J. M. (1995). Interrelationship of knowledge, 	0	1	0	0	1	0	1	0	0	0	0	1	0	0
interest, and recall: Assessing a model of domain														
learning. Journal of Educational Psychology, 87(4), 559–575.														
5. Badri, M., Yang, G., Al Mazroui, K.,	0	1	0	1	0	Schreiner, C., & Sjøberg, S. (2004). Sowing the	0	1	0	0	0	0	0	1
Mohaidat, J., Al Rashedi, A., & Al Housani, N.						seeds of ROSE. Background, rationale,								
(2017). Out-of-school experience categories influencing interest in biology of secondary						questionnaire development and data collection for the ROSE (The relevance of science								
school students by gender: exploration on an Abu						education): A comparative study of students'								
Dhabi sample. Journal of Biological Education, 51(2), 166–185.						views of science and science education. Acta Didactica. Oslo.								
6. Baram-Tsabari, A., Sethi, R. J., Bry, L., &	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Yarden, A. (2010). Identifying Students' Interests														
in Biology Using a Decade of Self-Generated Questions. Eurasia Journal of Mathematics,														
Science and Technology Education, 6(1), 63–75.														
7. Baram-Tsabari, A., & Yarden, A. (2007).	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest in Biology: A Developmental Shift														
Characterized Using Self- Generated Questions Article. American Biology Teacher, 69(9),														
532-540.														
 Baram-Tsabari, A., & Yarden, A. (2008). Girls' biology, boys' physics: evidence from 	1	0	0	0	0	0	0	0	0	0	0	0	0	0
free-choice science learning settings. Research in														
Science & Technological Education, 26(1), 75–92.														
9. Baram-Tsabari, A., & Yarden, A. (2011).	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Quantifying the Gender Gap in Science Interests. International Journal of Science and Mathematics														
Education, 9(3), 523-550.														
10. Barnes, G., McInerney, D. M., & Marsh, H.	0	1	0	0	1	0	0	0	1	0	0	0	0	0
W. (2005). Exploring sex differences in science enrolment intentions: An application of the														
General Model of Academic Choice. The														
Australian Educational Researcher, 32(2), 1–23. 11. Beigman Klebanov, B., Burstein, J.,	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Harackiewicz, J. M., Priniski, S. J., &		•	-	-	-	-	-	-	-	-	-	-	-	-
Mulholland, M. (2017). Reflective Writing About the Utility Value of Science as a Tool for														1
Increasing STEM Motivation and Retention -														1
Can AI Help Scale Up? International Journal of Artificial Intelligence in Education, 27(4),														i.
791-818.														
12. Bockholt, S. M., West, J. P., & Bollenbacher,	0	0	1	0	1	0	0	0	1	0	0	0	0	0
W. E. (2003). Cancer Cell Biology: A Student- Centered Instructional Module Exploring the Use														i.
of Multimedia to Enrich Interactive,														i.
Constructivist Learning of Science. Cell Biology Education, 2(1), 35–50.														
13. Bonser, S. P., de Permentier, P., Green, J.,	0	1	0	0	1	0	1	0	0	0	0	0	1	0
Velan, G. M., Adam, P., & Kumar, R. K. (2013). Engaging students by emphasising botanical														l.
concepts over techniques: innovative practical														l.
exercises using virtual microscopy. Journal of Biological Education, 47(2), 123–127.														l.
15. Cakmakci, G., Sevindik, H., Pektas, M.,	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Uysal, A., Kole, F., & Kavak, G. (2012).														
Investigating Turkish Primary School Students' Interest in Science by Using Their Self-Generated														i.
Questions. Research in Science Education, 42(3),														l.
469-489. 16. Çetin, G. (2014). Prospective Teachers'	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Views about Video-Enhanced General Biology				-	-			ĺ			-			-
Instruction. Educational Research and Reviews, 9(22), 1182–1199.														
/22), 1102-11//.		1			1									

18. Chittum, J. R., McConnell, K. D., & Sible, J.	0	0	1	1	0	Jones, B. D. (2012). User guide for assessing	0	0	1	0	0	0	0 (0
(2017). SCALE (ing)-UP Teaching: A Case						the components of the MUSIC Model of								
Study of Student Motivation in an Undergraduate						Academic Motivation. Retrieved from								
Course. Journal on Excellence in College						http://www.theMUSICmodel.com								
Touline 20(2) 110 157						http://www.ulewrosternoder.com								
Teaching, 28(3), 119-157.														
21. Cook, M., & Mulvihill, T. M. (2008).	0	0	1	1	0	Russell, J., & Hollander, S. (1975). A Biology	0	1	0	0	0	0	1 0	0
Examining US College Students' Attitudes						Attitude Scale. Source: The American Biology								
Towards Science: Learning From Non-Science						Teacher, 37(5), 270-273. doi:10.2307/4445229								
Majors. Educational Research and Review, 3(1),														
38–47.														
22. Cresswell, S. L., & Loughlin, W. A. (2017).	0	0	1	0	1	0	0	0	1	0	0	0	0 0	0
A Case-Based Scenario with Interdisciplinary														
Guided-Inquiry in Chemistry and Biology:														
Experiences of First Year Forensic Science														
Students. Journal of Chemical Education, 94(8),														
1074-1082.														
24. Daba, T. M., Anbassa, B., Oda, B. K., &	0	1	0	0	1	0	1	1	0	0	0	1	0 0	0
Degefa, I. (2016). Status of Biology Laboratory														
and Practical Activities in Some Selected														
Secondary and Preparatory Schools of Borena														
Zone, South Ethiopia. Educational Research and														
Reviews, 11(17), 1709-1718.														
26. Dohn, N. B. (2011). Situational interest of	1	0	0	0	0	0	0	0	0	0	0	0	0 0	0
high school students who visit an aquarium.	1			1									ľ	
Science Education, 95(2), 337–357.	1			1										
		-	t	-	-	L	-		-	_			-	-
27. Dohn, N. B. (2013). Upper Secondary	1	0	0	0	0	0	0	0	0	0	0	0	0 (0
Students' Situational Interest: A case study of the				1										
role of a zoo visit in a biology class. International				1										
Journal of Science Education, 35(16),	1			1										
2732-2751.	1			1										
28. Dohn, N. B., & Dohn, N. B. (2017).	0	0	1	0	1	0	0	1	0	0	0	0	1 (0
Integrating Facebook in Upper Secondary														
Biology Instruction: A Case Study of Students'														
Situational Interest and Participation in Learning														
Communication. Research in Science Education,														
47(6), 1305-1329.														
29. Durik, A. M., & Matarazzo, K. L. (2009).	0	1	0	0	1	0	0	0	0	0	1	0	0 (0
Revved up or turned off? How domain	-	-	-	-	-	-	-	-	-	-	-	-		-
Revved up of turned off. How domain														
knowledge changes the relationship between														
perceived task complexity and task interest.														
Learning and Individual Differences, 19(1),														
155-159.														
30. Erten, S. (2008). Interests of 5th Through	0	1	0	1	0	Finke, E., & Klen, R. (1999). Intressen an	0	1	0	0	0	0	0	1
10th Grade Students Toward Human Biology. H.	0		0		0	Humanbiologie in der Sekundarstufe. In	0	•	0	0	~	0	· ·	
U. Journal of Education, 35(1992), 135-147.						Bayrhube, H. u.a.(Hrsg.): Biologie und Bilding.								
						Kiel: IPN 350-354								
31. Evans, M. A., Jones, B. D., & Akalin, S.	1	0	0	0	0	0	0	0	0	0	0	0	0 0	0
(2017). Using Video Game Design to Motivate														
Students. Afterschool Matters, (26), 18-26.														
33. France, B., & Bay, J. L. (2010). Questions	1	0	0	0	0	0	0	0	0	0	0	0	0 /	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Students Ask: Bridging the gap between scientists														
and students in a research institute classroom.														
International Journal of Science Education, 32(2),														
173-194.														
35. Gafoor, A. K., & Narayan, S. (2012). Out-of-	0	1	0	1	0	Gafoor, K. A., & Smitha, N. (2008). Scale of	0	1	0	0	0	1	0 0	0
school experience categories influencing interest	1		·	1		Interest in Science (SIS). University of Calicut.			-				· · · ·	
	1			1		interest in science (515). University of Calicut.								
in science of upper primary students by gender	1			1										
and locale: Exploration on an Indian sample.	1			1										
Science Education International, 23(3), 191-204.			L	L										
37. Gardner, P. L., & Tamir, P. (1989b). Interest	0	1	0	0	1		0	0	0	1	0	0	0 (0
in biology. Part II: Relationship with the	1			1										
enrollment intentions of israeli senior high school	1			1										
	1			1										
biology students. Journal of Research in Science				1										
Teaching, 26(5), 425-433.	1													
38. Glowinski, I., & Bayrhuber, H. (2011).	0	0	1	0	1	0	0	0	1	0	0	0	0 0	0
Student Labs on a University Campus as a Type	1			1									ľ	
of Out-of-School Learning Environment:				1										
	1			1										
Assessing the Potential to Promote Students'	1			1										
Interest in Science. International Journal of	1			1										
Environmental and Science Education, 6(4),	1			1										
371–392.	1			1										
 371–392. Green, S., & Smith, J. (2005). Small Things 	0	0	<u>,</u>	0	1	0	0	0	0	0	1	0		0
	0	0	1	U	1	U C	U	U	U	U	1	U	0	U
Draw Big Interest. Science and Children, 42(4),				1										
30-34.														
40. Hagay, G., & Baram-Tsabari, A. (2011). A	0	0	1	0	1	0	0	1	0	0	0	1	0 (0
Shadow Curriculum: Incorporating Students'	1			1									ľ	
			1	1		1	1							
Interests into the Formal Biology Curriculum. Research in Science Education, 41(5), 611–634.														

41. Hagay, G., & Baram-Tsabari, A. (2012).	0	0	1	0	1	0	0	0	1	0	0	0	0	0
Including Students' Voices as Engagement With														
Curriculum: Perspectives From a Secondary														
Biology Course. Canadian Journal of Science,														
Mathematics and Technology Education, 12(2),														
160-177.														
42. Hagay, G., & Baram-Tsabari, A. (2015). A	0	0	1	0	1	0	0	0	1	0	0	0	0	0
strategy for incorporating students' interests into	-		-	-	-		-	-	-	-	-			-
the high-school science classroom. Journal of														
Research in Science Teaching, 52(7), 949–978.														
 Hagay, G., Baram-Tsabari, A., Ametller, J., 	0	1	0	1	0	Hagay, G., & Baram-Tsabari, A. (2011). A	0	1	0	0	0	1	0	0
Cakmakci, G., Lopes, B., Moreira, A., & Pedrosa-	0	1	0	1	0	Shadow Curriculum: Incorporating Students'	0	1	0	0	0	1	0	0
de-Jesus, H. (2013). The Generalizability of						Interests into the Formal Biology Curriculum.								
Students' Interests in Biology Across Gender,						Research in Science Education, 41(5), 611–634.								
Country and Religion. Research in Science						doi:10.1007/s11165-010-9182-5								
Education, 43(3), 895-919.														
47. Harrison, M., Dunbar, D., Ratmansky, L.,	0	0	1	0	1	0	1	0	0	0	0	1	1	0
Boyd, K., & Lopatto, D. (2011). Classroom-														
Based Science Research at the Introductory														
Level: Changes in Career Choices and Attitude.														
CBE-Life Sciences Education, 10(3), 279-286.														
48. Hartwell, M., & Kaplan, A. (2018). Students'	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Personal Connection with Science: Investigating		1												
the Multidimensional Phenomenological		1												
Structure of Self-Relevance. The Journal of		1												
Experimental Education, 86(1), 86-104.		1												
49. Harvey, P. A., Wall, C., Luckey, S. W.,	0	1	0	1	1	0	1	0	0	0	0	1	0	0
Langer, S., & Leinwand, L. A. (2014). The	-		-	1	-		-	-	-	-	-	-	-	-
Python Project: A Unique Model for Extending		1												
Research Opportunities to Undergraduate														
Students. CBE—Life Sciences Education, 13(4),														
698–710.														
	0		0		0		0		0	0	0		0	0
50. Hazari, B. Z., Sadler, P. M., & Sonnert, G.	0	1	0	1	0	Miller-Friedmann, J., & Sonnert, G. (2009).	0	1	0	0	0	1	0	0
(2013). The Science Identity of College Students:						Project PRiSE: Persistence Research in Science								
Exploring the Intersection of Gender, Race, and						and Engineering. Retrieved from								
Ethnicity. Journal of College Science Teaching,						https://www.cfa.harvard.edu/sed/projects/PRiSE								
42(5), 82-91.						survey proof.pdf								
51. Heddy, B. C., & Sinatra, G. M. (2017).	0	1	0	1	0	Linnenbrink-Garcia, L., Durik, A. M., Conley,	0	0	0	1	0	0	0	0
Transformative parents: Facilitating						A. M., Barron, K. E., Tauer, J. M., Karabenick,								
transformative experiences and interest with a						S. A., & Harackiewicz, J. M. (2010). Measuring								
parent involvement intervention. Science						Situational Interest in Academic Domains.								
Education, 101(5), 765-786.						Educational and Psychological Measurement,								
						70(4), 647-671.								
						doi:10.1177/0013164409355699								
52. Heilbronner, N. N. (2013). The STEM	0	0	1	0	1	0	1	0	0	0	0	0	0	0
Pathway for Women. Gifted Child Quarterly,														
57(1), 39-55.														
53. Heldt, C. L., Bank, A., Turpeinen, D., &	0	1	0	0	1	0	1	0	0	0	0	1	0	0
King, J. A. (2016). Translating University	-		-	-				-	-	-				
Biosensor Research to a High School Laboratory														
Experience. Chemical Engineering Education,														
50(1), 70–75.														
56. Holstermann, N., Ainley, M., Grube, D.,	0	1	0	1	0	Schiefele, U., & Krapp, A. (1996). Topic	0	1	0	1	0	1	0	0
Roick, T., & Bögeholz, S. (2012). The Specific	-	[⁻	-	1	-	interest and free recall of expository text.		1	-	-	-	1		-
Relationship Between Disgust and Interest:						Learning and Individual Differences, 8(2),								
Relevance During Biology Class Dissections and						141–160. doi:10.1016/S1041-6080(96)90030-8								
Gender Differences. Learning and Instruction,		1				1+1-100. 001.10.1010/31041-0080(90)90030-8								
22(3), 185–192.														
	0	1	0	0	1	0	1	0	0	0	0		0	0
57. Holstermann, N., Grube, D., & Bögeholz, S.	U	1	U	U	1	U	1	U	U	0	U	1	U	U
(2010). Hands-on Activities and Their Influence		1												
on Students' Interest. Research in Science		1												
Education, 40(5), 743-757.	-		-	-	-	-	-		_	-				
59. Hong, J., Shim, K., & Chang, N. (1998). A	0	1	0	0	1	0	0	1	0	0	0	1	0	0
study of Korean middle school students' interests		1												
in biology and their implications for biology		1												
education. International Journal of Science														
Education, 20(8), 989-999.														
60. Howard, D. R., & Miskowski, J. A. (2005).	0	1	0	0	1	0	1	0	0	0	0	1	0	0
Using a Module-based Laboratory To Incorporate														
Inquiry into a Large Cell Biology Course. Cell														
Biology Education, 4(3), 249–260.														
62. Hu, R., Chang, WH., & Lin, CY. (2003).	0	1	0	0	1	0	1	0	0	0	0	0	0	1
Science Curriculum Components Favoured by	-	1	1					ľ.		-				
High School Students in Taiwan. Journal of		1												
Biological Education, 37(4), 171–175.		1												
Diological Education, 57(4), 171-175.						I								

64. Jones, M. G., Minogue, J., Oppewal, T.,	0	1	0	0	1	0	1	0	0	0	0	1	0	0
Cook, M. P., & Broadwell, B. (2006). Visualizing														
Without Vision at the Microscale: Students With														
Visual Impairments Explore Cells With Touch.														
Journal of Science Education and Technology,														
15(5-6), 345-351.														
66. Kelly, A. (1988). The Customer is Always	0	1	0	1	0	Kelly, A., Whyte, J., & Smail, B. (1984). Girls	0	1	0	0	0	0	1	0
RightGirls' and Boys' Reactions to Science						Into Science and Technology: Final Report.								
Lessons. The School Science Review, 69(249),														
662-676.														
68. Kidman, G. (2009). Attitudes and Interests	0	0	1	0	1	0	1	0	0	0	0	0	0	1
Towards Biotechnology: the Mismatch Between														
Students and Teachers. Eurasia Journal of														
Mathematics, Science and Technology Education,														
5(2), 135–143.														
69. Kışoğlu, M. (2018). An Examination of	0	1	0	1	0	Derya ATİK, A., Kayabaşi, Y., Yağci, E., Ünlü	0	1	0	0	0	0	1	1
Science High School Students' Motivation	0	1	0		0	Erkoç, F., & Tarihi, B. (2015). Ortaöğretim	0		0	0	0	0	1	
towards Learning Biology and Their Attitude						Öğrencilerinin Biyoloji Bilimine ve Dersine								
Towards Biology Lesson. International Journal of						Yönelik Tutum Ölçeği: Geçerlik ve The								
Higher Education, 7(1), 151-164.						Secondary School Students Biology Science and								
						Course Attitude Scale: Analysis of Reliability								
						and Validity. Mehmet Akif Ersoy Üniversitesi								
						Eğitim Fakültesi Dergisi, (36), 1-18. Retrieved								
						from								
						http://toad.edam.com.tr/sites/default/files/pdf/bi								
						yoloji-bilimine-ve-dersine-yonelik-tutum-olcegi-								
						toad.pdf								
						Aydin, S., Yerdelen, S., Yalmanci, S. G., &								
						Göksu, V. (2014). Academic motivation scale								
						for learning biology: A scale development study.								
						Egitim ve Bilim, 39(176), 425-435.								
						doi:10.15390/EB.2014.3678								
70. Kitchen, E., Reeve, S., Bell, J. D., Sudweeks,	0	1	0	0	1	0	0	1	0	0	0	0	0	1
R. R., & Bradshaw, W. S. (2007). The	0		0	0		0	v	1	0	0	0	0	0	
Development and Application of Affective														
Assessment in an Upper-Level Cell Biology														
Course. Journal of Research in Science Teaching,														
44(8), 1057-1087.														
	-	-	-		-		-	-		-	-	-	-	-
71. Klingenberg, K. (2014). 'Primärerfahrung'	0	1	0	1	0	Bauhardt, V. (1990). Die Vera nderung der	0	0	1	0	0	0	0	0
71. Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational	0	1	0	1	0	Einstellung gegenu "ber Gliedertieren durch	0	0	1	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. 	0	1	0	1	0	Einstellung gegenu "ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht	0	0	1	0	0	0	0	0
71. Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational	0	1	0	1	0	Einstellung gegenu"ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by	0	0	1	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. 	0	1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during	0	0	1	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. 	0	1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons]. University of Munich.	0	0	1	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). 	0	0	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lesson2, University of Manich. Adams, W. K., Perkins, K. K., Podolefsky, N.	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors 	0 0	0	0	1	0	Einstellung gegenu 'ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman,	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). 	0 0	0	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lesson2, University of Manich. Adams, W. K., Perkins, K. K., Podolefsky, N.	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors 	0	0	0	1	0	Einstellung gegenu 'ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman,	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life 	0	0	0	1	0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education.Life Sciences Education, 	0	0	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education.Life Sciences Education, 	0	0	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education.Life Sciences Education, 	0	0	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lessons]. University of Manich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101.	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. 	0 0 0 0	1 0 1	0	1	0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.2.010101	0	0	0	0	0	0	1	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). 	0 0 0 0	1 0 1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Amelids hy Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., &	0	0	0	0	0	0	0	0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics 	0 0 0 0	1 0 1 1	0	1	0	Einstellung gegenu 'ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons]. University of Manich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics Science Survey. Physical Review Special Topics Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better	0	0	0	0	0	0	0	0 0 0 0 0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austim, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of 	0 0 0 0	0	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their	0	0	0	0	0	0	0	0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics 	0 0 0 0	1 0 1 1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht Jättiude Change towards Amelids hy Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the	0	0	0	0	0	0	0	0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonnajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education. Jife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology. Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. 	0 0 0 0 0	1 0 1 1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their	0	0	0	0	0	0	0	0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. 	0 0 0 0 0 0 0	1 0 1 1 1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Amelids hy Interaction with Lring Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the	0	0	1 0 0	0 0 0 0 0 0	0	0	0	0 0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubaitko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors 	0 0 0 0 0 0 0	1 0 1 1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Amelids hy Interaction with Lring Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the	0	0	0	0 0 0 0 0 0	0	0	0	0 0 0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education.Ife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a 	0 0 0 0	1 0 1 1 1	0	1 1 1 0	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Amelids hy Interaction with Lring Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the	0	0	1 0 0	0	0	0	0	0 0 0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy 	0 0 0 0 0 0 0	1 0 1 1	0	1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Amelids hy Interaction with Lring Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 010101. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the	0	0	0	0 0 0 0 0 0	0	0	0	0 0 0 0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Cent for Educational Policy Studies Journal, 7(2), 127–140. 	0 0 0 0 0 0 0	1 0 1 1 1 0	0	1	0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffirurd, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40).	0	0	1 0 0	0 0 0 0 0 0 0	0	0	0	0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larson, S.C. (2014). Exploring the Roles of 	0 0 0 0 0	1 0 1 1 0	0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40).	0 1 1 0	0 1 0 0 0	1 0 0 1 1	0 0 0 0	0 0 0 0	0 1 1 0	0	0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubaitko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic 	0 0 0 0 0	1 0 1 1 0	0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 1 0 0 0 0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40).	0 1 1 0 0	0 1 0 0 0 0	1 0 1 1	0 0 0 0	0 0 0 0 0 0 0	0	0	0 0 0 0 0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonnajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education. Jife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic 	0 0 0 0 0	1 0 1 1 0	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0	0 1 0 0	1 0 0 1	0 0 0 0 0 0 0 0	0	0	0	0 0 0 0 0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education.Life Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Stuares, D. S. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. 	0 0 0 0 0	1 0 1 1 0	0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 1 1 0 0 0	Einstellung gegenu ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids hy Interaction with Living Animals during Lessons]. University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPER.2.010101 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap. On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40).	0 1 1 0 0	0 0 0 0 0 0	1 0 0 1	0 0 0 0	0	0 1 0 0	0	0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Mutrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. 	0 0 0 0 0	1 0 1 1 0	0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0	0 0 0 0 0 0	1 0 0 1 1	0 0 0 0 0 0 0	0	0	0	0 0 0 0
 71. Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. 72. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education.1fe Sciences Education, 9(Spring), 34–44. 73. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. 74. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. 75. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. 76. Laut, J., Bartolini, T., & Porfiri, M. (2015). 	0 0 0 0 0 1	1 0 1 1 0 0	0 1 1 0 0 0 0 0 0	1 1 1 1 1 0 0 0	0 1 1 0 0 0 0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 0 0 0	0 0 0 0 0 0 0	1 0 0 1 1 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0	0 1 1 0 0 0 0 0	0 1 1 0 0 0 0 0	0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34-44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubaitako, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Resarch and Instruction, 53(4), 287–325. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspiring an Interest in STEM. LEEE 	0 0 0 0 1	1 0 1 1 0 0	0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 1 0 0	0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 0	0 1 0 0 0 0	1 0 0 1 1 0	0 0 0 0 0	0 0 0 0 0	0 1 1 0 0	0 1 0 0 0 0 0 0	0 0 0 0 0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larason, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspring an Interest in STEM. IEEE Transactions on Education, 38(1), 48–55. 	0 0 0 0 0 1	1 0 1 1 0 0	0 1 0 0 0 0 0	1 1 1 0	0 1 0 0 0 0 0	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0	0 1 0 0 0	1 0 0 1 1 0	0 0 0 0 0	0 0 0 0	0 1 1 0 0	0 1 1 0 0	0 0 0 0 0 0
 71. Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. 72. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. 73. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. 74. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. 75. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. 76. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspiring an Interest in STEM. IEEE Transactions on Education, 58(1), 48–55. 71. Looradt, W. (1989). A Comparison of 	0 0 0 0 0 1 0	1 0 1 1 0 0 0	0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 1 0 0	0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 1	0 1 0 0 0 0 0 0 0	1 0 0 1 1 0 0	0 0 0 0 0 0	0 0 0 0 0	0 1 1 0 0	0 1 1 0 0 0	0 0 0 0 0 0 0
 71. Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. 72. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. 73. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. 74. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. 75. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. 76. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspiring an Interest in STEM. IEEE Transactions on Education, 58(1), 48–55. 71. Looradt, W. (1989). A Comparison of 	0 0 0 0 0 1 0	1 0 1 1 0 0	0 1 1 0 0 0 0 0 0 0 0	1 1 1 0 1 0	0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 1	0 1 0 0 0 0	1 0 0 1 1 1 0 0	0 0 0 0 0 0	0 0 0 0 0	0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 1 1 0 0 0 0 0	0 0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larason, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspring an Interest in STEM. IEEE Transactions on Education, 38(1), 48–55. 	0 0 0 0 0 1 0 0	1 0 1 1 0 0 1	0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 1 0 0	0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 1 1 0 0	0 0 0 0 0 0	0 0 0 0 0	0 1 1 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0 1 1 0 0 0 0 0 0	0 0 0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primärerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences EducationLife Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubaitko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies, Literacy Neagement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. Laut, J., Bartolini, T., & Porfiri, M. (2015). Student Sudents' Poly. Amorgen of Students on Educations of S(1), 48–55. Choard, W. (1989). A Comparison of Students to Biology Instruction by 	0 0 0 0 0 1 0	1 0 1 1 0 0 1	0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 1 0 0	0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 0 0 1 1 0 0	0 0 0 0 0 0	0 0 0 0 0	0 1 1 0 0	0 1 1 0 0 0 0 0 0	0 0 0 0 0 0
 Klingenberg, K. (2014). 'Primårerfahrung' with Living Animals in Contrast to Educational Videos: A Comparative Intervention Study. Journal of Biological Education, 48(2), 105–112. Knight, J. K., & Smith, M. K. (2010). Different but Equal? How Nonmajors and Majors Approach and Learn Genetics. CBE—Life Sciences Education. Life Sciences Education, 9(Spring), 34–44. Kosal, E., Lawrence, C., & Austin, R. (2010). Integrating Biology, Chemistry, and Mathematics to Evaluate Global Water Problems. Journal of College Science Teaching, 40(1), 41–47. Kubiatko, M., Torkar, G., & Rovnanova, L. (2017). The Teacher as One of the Factors Influencing Students' Perception of Biology as a School Subject. Center for Educational Policy Studies Journal, 7(2), 127–140. Larson, S. C. (2014). Exploring the Roles of the Generative Vocabulary Matrix and Academic Literacy Engement of Ninth Grade Biology Students. Literacy Research and Instruction, 53(4), 287–325. Lauson, J. Laward, T., & Porfiri, M. (2015). Bioinspring an Interest in STEM. IEEE <u>Transactions on Education, 58(1), 48–55.</u> Leonard, W. (1989). A Comparison of Student Reactions to Biology Instruction by Interactive Videodiso or Conventional 	0 0 0 0 0 1 0	1 0 1 1 0 0	0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 1 0 0	0 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Einstellung gegent ber Gliedertieren durch Interaktion mit Lebenden Tieren im Unterricht [Attitude Change towards Annelids by Interaction with Lring Animals during Lessons], University of Munich. Adams, W. K., Perkins, K. K., Podolefsky, N. S., Dubson, M., Finkelstein, N. D., & Wieman, C. E. (2006). New instrument for measuring student beliefs about physics and learning physics: The Colorado Learning Attitudes about Science Survey. Physical Review Special Topics - Physics Education Research, 2(1), 01001. doi:10.1103/PhysRevSTPEE.20.01001 Seymour, E., Wiese, D. J., Hunter, A., & Daffinrud, S. M. (2000). Creating a Better Mousetrap: On-line student assessment of their learning gains. In National Meeting of the American Chemical Society (pp. 1–40). Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. <i>New Directions for Methodology of Social & Behavioral</i>	0 1 1 0 0 1 1	0 1 0 0 0 0 0	1 0 0 1 1 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0	0 1 1 0 0	0 1 1 0 0 0	0 0 0 0 0 0 0

80. Linnenbrink-Garcia, L., Pugh, K. J., Koskey,	0	1	0	1	0	Linnenbrink-Garcia, L., Durik, A. M., Conley,	0	0	0	1	0	0	0 (0
K. L. K., & Stewart, V. C. (2012). Developing						A. M., Barron, K. E., Tauer, J. M., Karabenick,								
Conceptual Understanding of Natural Selection:						S. A., & Harackiewicz, J. M. (2010). Measuring								
The Role of Interest, Efficacy, and Basic Prior						Situational Interest in Academic Domains.								
Knowledge. The Journal of Experimental						Educational and Psychological Measurement,								
Education, 80(1), 45-68.						70(4), 647-671.								
						doi:10.1177/0013164409355699								
81. Liu, N., & Neuhaus, B. (2014). Gender	0	1	0	1	0	Rotgans, J. I., & Schmidt, H. G. (2011).	0	0	1	0	1	0	0 0	0
Inequality in Biology Classes in China and Its						Situational interest and academic achievement in								
Effects on Students' Short-Term Outcomes.						the active-learning classroom. Learning and								
International Journal of Science Education,						Instruction, 21(1), 58-67.								
36(10), 1531–1550.						doi:10.1016/j.learninstruc.2009.11.001								
50(10), 1551-1550.						doi.10.1010/j.ieaminstruc.2009.11.001								
						Wild, E., Hofer, M., & Pekrun, R. (2001).								
						Psychologie des Lernens. In A. Krapp & B.								
						Eidenmann (Eds.), Pädagogische Psychologie								
						(pp. 207-270). Weinheim: PVU.								
85. Meyer, A., Meyer-Ahrens, I., & Wilde, M.	0	1	0	1	0	Deci, E. L., & Ryan, R. M. (n.d.).	0	0	1	0	0	0	0 (0
(2013). The Beneficial Effects of Non-Received	-					selfdeterminationtheory.org - Intrinsic	-	-						-
Choice: A Study on Intrinsic Motivation in						Motivation Inventory (IMI). Retrieved								
Biology Education. European Journal of						December 17, 2018, from								
Educational Research, 2(4), 185-190.						http://selfdeterminationtheory.org/intrinsic-								
						motivation-inventory/								
86. Monroe, M. C., Hall, S., & Li, C. J. (2016).	1	0	0	0	0	0	0	0	0	0	0	0	0 0	0
Can climate change enhance biology lessons? A				1	1		1							
quasi-experiment. Applied Environmental				1	1		1							
Education & Communication, 15(2), 125-137.				1	1		1							
 Nadelson, L. S., Walters, L., & Waterman, J. 	0	1	0	0	1	0	1	0	0	0	0	0	0 0	0
(2010). Course-Integrated Undergraduate	0	•	0	°				•	0	0	°	0	· · ·	,
Research Experiences Structured at Different														
Levels of Inquiry. Journal of STEM Education,														
11(1), 27-45.														
91. Nawani, J., Rixius, J., & Neuhaus, B. J.	0	1	0	1	0	Wild, E., Hofer, M., & Pekrun, R. (2006).	0	0	0	0	1	0	0 0	0
(2016). Influence of using challenging tasks in						Psychologie des Lernens. In A. Krapp & B.								
biology classrooms on students' cognitive						Weidenmann (Eds.), Pädagogische Psychologie								
knowledge structure: an empirical video study.						(pp. 203-268). Weinheim: PVU.								
International Journal of Science Education,						(pp. 203-208). weimienn. r v 0.								
38(12), 1882–1903.														
93. Nyberg, E., & Sanders, D. (2014). Drawing	0	1	0	0	1	0	1	0	0	0	0	0	1 0	0
attention to the 'green side of life.' Journal of														
Biological Education, 48(3), 142-153.														
94. Pai, A. (2009). Evolution in Action, a Case	0	1	0	0	1	0	0	0	1	0	0	0	0 (0
Study Based Advanced Biology Class at Spelman	-			-			-	-						
College. The Journal of Effective Teaching, 9(2),														
54-68.														
95. Paris, S. G., Yambor, K. M., & Packard, B.	0	0		0	1	0	0		0	0	0	0		0
	0	0	1	0	1	0	0	1	0	0	0	0	1	J
W. (1998). Hands-On Biology: A Museum-														
School-University Partnership for Enhancing														
Students' Interest and Learning in Science. The														
Elementary School Journal, 98(3), 267-288.														
97. Prokop, P., Prokop, M., & Tunnicliffe, S. D.	0	0	1	0	1	0	0	0	1	0	1	0	0 (0
(2007). Is biology boring? Student attitudes														
toward biology. Journal of Biological Education,														
42(1), 36–39.														
42(1), 56–59. 98. Prokop, P., Tuncer, G., & Chudá, J. (2007).	0	1	0	0	1	0	0	0	1	0	0	0	0	0
	v	•	·	°	*	v	, and the second	~		v	v	v	· ·	5
Slovakian Students' Attitudes toward Biology.				1	1		1							
Eurasia Journal of Mathematics, Science and				1	1		1							
Technology Education, 3(4), 287-295.														
100. Randler, C., & Bogner, F. X. (2007). Pupils'	0	1	0	1	1	Laukenmann, M., Bleicher, M., Fu, S., Gläser-	0	0	1	0	0	0	0	1
Interest Before, During, and After a Curriculum				1	1	Zikuda, M., Mayring, P., & von Rhöneck, C.	1							
Dealing With Ecological Topics and its				1	1	(2003). An investigation of the influence of	1							
Relationship. Educational Research and						emotional factors on learning in physics	1							
Evaluation, 13(5), 463–478.						instruction. International Journal of Science	1							
				1	1	Education, 25(4), 489–507.	1							
1				1	1	doi:10.1080/09500690210163233	1							
	0	1	0		0		0	0	0	0		0	0	0
101. Randler, C., Osti, J., & Hummel, E. (2012).	U	1	U	1	U	Löwe, B. (1987). Interessenverfall im	U	U	U	U	1	U	U (J
Decline in Interest in Biology among Elementary				1	1	Biologieunterricht.	1							
School Pupils During a Generation. Eurasia				1	1	Unterricht Biologie, 11 (124), 62-65.	1							
Journal of Mathematics, Science and Technology				1	1		1							
Education, 8(3), 201-205.				1	1		1							
102. Renninger, K. A., & Bachrach, J. E. (2015).	1	0	0	0	0	0	0	0	0	0	0	0	0 4	0
Studying Triggers for Interest and Engagement	-	-		-	-	-	-	~	-		-	-	~ ľ	-
Using Observational Methods. Educational					1		I							
				1	1		1							
Psychologist, 50(1), 58-69.														
105. Robinson, M., & Ochs, G. T. (2008).	0	0	1	0	1	0	1	0	0	0	0	1	0 0	0
Determining Why Students Take More Science				1	1		1							
Than Required in High School. Bulletin of							1							
Science, Technology & Society, 28(4), 338-348.				1	1		1							

106. Ryu, M. (2015). Understanding Korean	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Transnational Girls in High School Science														
Classes: Beyond the Model Minority Stereotype.														
Science Education, 99(2), 350–377.														
107. Sadler, T. D., Romine, W. L., Menon, D.,	0	,	0		0	Romine, W., Sadler, T. D., Presley, M., &	0	0		0	0	0	0	0
	0	1	0	1	0		0	0	1	0	0	0	0	0
Ferdig, R. E., & Annetta, L. (2015). Learning						Klosterman, M. L. (2014). Student Interest in								
Biology Through Innovative Curricula: A						Technology and Science (SITS) Survey:								
Comparison of Game- and Nongame-Based						Development, Validation, and Use of a New								
Approaches. Science Education, 99(4), 696-720.						Instrument. International Journal of Science								
						and Mathematics Education, 12(2), 261-283.								
						doi:10.1007/s10763-013-9410-3								
109. Schiefele, U., & Csikszentmihalyi, M.	0	1	0	0	1	0	1	0	0	0	0	0	0	0
(1994). Interest and the Quality of Experience in	0		0	0			•	0	°	0	0	0	~	0
Classrooms. European Journal of Psychology of														
Education, 9(3), 251-270.														
110. Sezen Vekli, G. (2013). Summer science	1	0	0	0	0	0	0		0	0	0	0	0	0
camp for middle school students: A Turkish														
experience. Asia-Pacific Forum on Science														
Learning and Teaching, 14(1), 1-26.														
112. Sikes, S. S., & Schwartz-Bloom, R. D.	0	1	0	0	1	0	1	0	0	0	0	0	0	1
(2009). Direction discovery. Biochemistry and														
Molecular Biology Education, 37(2), 77–83.														
113. Simon, U. K., Steindl, H., Larcher, N.,	0	0	1	0	1	0	0	0	1	0	0	0	0	0
Kulac, H., & Hotter, A. (2016). Young science	0	0	1	0	1	0	0	0	1	0	0	0	0	0
Kulac, H., & Hotter, A. (2010). Foung science														
journalism: writing popular scientific articles may														
contribute to an increase of high-school students'														
interest in the natural sciences. International				1										
Journal of Science Education, 38(5), 814-841.				1	1									
119. Strgar, J. (2007). Increasing the interest of	0	0	1	0	1	0	1	0	0	0	0	1	0	0
students in plants. Journal of Biological														
Education, 42(1), 19–23.														
120. Sumter, T. F., & Owens, P. M. (2011). An	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	0
approach to teaching general chemistry II that														
highlights the interdisciplinary nature of science.														
Biochemistry and Molecular Biology Education,														
39(2), 110-116.														
122. Taber, K. (1991). Gender Differences in	0	1	0	0	1	0	1	0	0	0	0	1	0	0
Science Preferences on Starting Secondary														
School. Research in Science & Technology														
Education, 9(2), 245–251.														
123. Takemura, M., & Kurabayashi, M. (2014).	0	0	1	0	1	0	1	0	0	0	0	0	0	0
Using analogy role-play activity in an	0	0	1	0	1	0	1	0	0	0	0	0	0	0
undergraduate biology classroom to show central														
dogma revision. Biochemistry and Molecular														
Biology Education, 42(4), 351-356.														
124. Tamir, P., & Gardner, P. (1989). The	0	1	0	0	1	0	0	1	0	0	0	1	0	0
Structure of Interest in High School Biology.														
Research in Science & Technological Education,														
7(2), 113–140.														
125. Travis, H., & Lord, T. (2004). Traditional	0	0	1	1	0	Moore, R. W., & Foy, R. L. H. (1997). The	0	0	1	0	0	0	0	0
and Constructivist Teaching Techniques:	0	0			0	Scientific Attitude Inventory: A Revision (SAI	0	0		0	0	0	0	0
				1	1									
Comparing Two Groups of Undergraduate				1		II). Journal of Research in Science Teaching,								
Nonscience Majors in a Biology Lab. Journal of				1	1	34(4), 327-336. doi:10.1002/(SICI)1098-								
College Science Teaching, 34(3), 12-18.				1		2736(199704)34:4<327::AID-TEA3>3.0.CO;2-								
			L			Т								
126. Tsui, CY., & Treagust, D. F. (2003).	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Genetics Reasoning with Multiple External				1	1									
Representations. Research in Science Education,				1										
33, 111–135.				1	1									
128. Uitto, A. (2014). Interest, attitudes and self-	0	1	0	0	1	0	0	1	0	0	0	0	0	1
efficacy beliefs explaining upper-secondary				1	1			1			· .			
school students' orientation towards biology-				1										
related careers. International Journal of Science				1										
				1	1									
and Mathematics Education, 12(6), 1425-1444.	-	-	-		-		-		-	-		_	_	
129. Uitto, A., Juuti, K., Lavonen, J., & Meisalo,	0	1	0	1	0	Schreiner, C., & Sjøberg, S. (2004). Sowing the	0	1	0	0	0	0	0	1
V. (2006). Students' interest in biology and their				1		seeds of ROSE. Background, rationale,								
out-of-school experiences. Journal of Biological				1		questionnaire development and data collection								
Education, 40(3), 124-129.				1	1	for the ROSE (The relevance of science								
				1		education): A comparative study of students'								
				1	1	views of science and science education. Acta								
				1	1	Didactica. Oslo.								
120 Litte A Lunti K Landa L C Main	0	1	0		0		0	1	0	0	0	0	0	
130. Uitto, A., Juuti, K., Lavonen, J., & Meisalo,	v	1	U	1	v	Schreiner, C., & Sjøberg, S. (2004). Sowing the	U	1	U	U	v	U	v	1
V. (2008). The Importance of Pupils' Interests				1		seeds of ROSE. Background, rationale,								
and Out-of-School Experiences in Planning				1	1	questionnaire development and data collection								
Biology Lessons. Science Education Review,				1		for the ROSE (The relevance of science								
7(1), 23-27.				1	1	education): A comparative study of students'								
				1		views of science and science education. Acta								
1				1	1	Didactica. Oslo.								

		-	-	-	-	-	-	-	-	-	-	-	-	-
131. Van Horne, K., & Bell, P. (2017). Youth	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Disciplinary Identification During Participation in														
Contemporary Project-Based Science														
Investigations in School. Journal of the Learning														
Sciences, 26(3), 437-476.														
133. Walter, C., & Walter, P. (2018). Is Critical	0	1	0	1	1	Rheinberg, F., & Wendland, M. (2001).	0	0	0	0	1	0	0	0
Thinking a Mediator Variable of Student						Veränderung der Lernmotivation in Mathematik								
Performance in School? Educational Research						und Physik: eine Komponentenanalyse und der								
Quarterly, 41.3, 4–23.						Einfluss elterlicher sowie schulischer								
gaarieriy, 11.5, 1 25.						Kontextfaktoren. Retrieved from http://www.w-								
						lab.de/biqua projekt								
						lab.ue/biqua_pi0jekt								
134. White, H. (2007). Problem Based Learning	0	1	0	0	1	0	1	0	0	0	0	1	0	0
The eyes have it. Biochemistry and Molecular														
Biology Education, 35(3), 213-218.														
135. Wiens, D. J., Depping, D. J., Wallerich, S.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
R., Van Laar, E. S., & Juhl, A. L. (2003). Gender														
Matters. Journal of College Science Teaching,														
33(1), 32-36.														
137. Yilmaz, M., & Demirhan, H. (2014).	0	1	0	0	1	0	0	1	0	0	0	1	0	0
Variables Predicting Prospective Biology														
Teachers' Acceptance Perceptions Regarding														
Gene Technology. European Journal of Science														
and Mathematics Education, 2(3), 183-192.														
139. Zimmerman, H. T., & McClain, L. R.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
(2016). Family learning outdoors: Guided														
participation on a nature walk. Journal of														
Research in Science Teaching, 53(6), 919-942.														