Supplemental Material

CBE—Life Sciences Education

Rowland *et al.*

Supplementary Information Table of Contents

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.
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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/10zl0-b1EdaZvTrKBbUOlwzsnFqBm69FueIvjMjl_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:

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	Gardner, P. L., & Tamir, P. (1989). Interest in biology. Part I: A multidimensional construct. Journal of Research in Science Teaching, 26(5), 409–423. doi:10.1002/tea.3660260506	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	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, 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	Schiefele 1991, 2001, 2009	Gardner and Tamir 1989; Gardner 1985; Gardner 1998	Ryan & Deci, 2000; Deci, 1992	Csikszentmihalyi and Hermanson 1995 Rathunde & Csikszentmihalyi, 1993	NA
Total Number of Papers Referencing Each Defintion	**21**	**6**	**4**	**4**	**2**	**14**
5. 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	0	0	0	0	1
7. 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	0	0	1	0	0
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 Self-Generated Questions. *Research in Science Education*, *42*(3), 469–489.	0	0	0	0	0	1
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.	0	0	0	0	0	1
26. Dohn, N. B. (2011). Situational interest of high school students who visit an aquarium. *Science Education*, *95*(2), 337–357.	1	1	0	0	0	1
27. 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.	1	0	0	0	1	0
28. 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	0	0	0	0
30. 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
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.	1	0	0	0	0	1
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.	0	0	1	0	0	1
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.	0	0	1	0	0	0
38. 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.	1	0	0	0	0	0
40. 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.	0	0	0	1	0	0
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.	0	0	0	0	0	0
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.	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. *International Journal of Science and Mathematics Education*, *11*(2), 407–431.	1	0	0	1	0	0

48. 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.	1	0	0	0	0	0
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.	1	0	0	0	0	0
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.	1	1	0	0	0	0
59. 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.	0	0	1	0	0	1
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.	0	0	0	1	0	0
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.	0	0	0	0	0	1
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.	1	0	0	0	0	0
79. Li, Y. (2011). On the Cultivation of Students' Interests in Biology Teaching. *International Education Studies*, *4*(2), 141–143.	0	0	0	0	0	1
80. 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.	0	1	0	0	0	0
81. 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.	1	0	0	0	0	1
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.	1	0	0	0	0	0
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.	0	1	0	0	0	0
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.	1	0	0	0	0	1
102. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engagement Using Observational Methods. *Educational Psychologist*, *50*(1), 58–69.	1	0	0	0	0	0
109. Schiefele, U., & Csikszentmihalyi, M. (1994). Interest and the Quality of Experience in Classrooms. *European Journal of Psychology of Education*, *9*(3), 251–270.	0	1	0	0	0	0
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 high-school students' interest in the natural sciences. *International Journal of Science Education*, *38*(5), 814–841.	1	0	1	0	0	1
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.	1	0	0	0	0	0
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.	1	0	0	0	0	0
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.	1	0	0	0	0	0
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.	0	0	0	0	0	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)
Foundational 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	Krapp, A. (1993). Characteristics of Individual Interests and Interest-Related Actions from the Perspective of a Person-Object-Theory. Studies in Educational Psychology, 4(January), 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	Schiefele, U. (1991). Interest, Learning, and Motivation. Educational Psychologist, 26(3–4), 299–323. doi:10.1080/00461520.1991.9653136	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,	Csikszentmihalyi 1975, 1988; Csikszentmihalyi and Hermanson 1995	Dewey 1902, 1913	NA
Total Number of Papers Referencing the Theory	**23**	**20**	**17**	**13**	**8**	**2**	**2**	**26**
2. 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
5. 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	1	0	0	0	0	0	0
6. 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
7. 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
8. 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
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.	0	1	1	0	0	0	0	0
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.	0	0	0	0	1	0	0	0
11. 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
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 Self-Generated Questions. *Research in Science Education*, *42*(3), 469–489.	1	1	0	0	0	0	0	1
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.	1	0	1	0	1	0	0	1
26. Dohn, N. B. (2011). Situational interest of high school students who visit an aquarium. *Science Education*, *95*(2), 337–357.	0	0	0	0	0	0	0	1
27. 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.	1	1	1	0	0	0	0	0
28. 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
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.	1	1	0	1	0	0	0	1
30. Erten, S. (2008). Interests of 5th Through 10th Grade Students Toward Human Biology. *H. U. Journal of Education*, *35*(1992), 135–147.	0	1	0	0	0	0	0	0

31. Evans, M. A., Jones, B. D., & Akalin, S. (2017). Using Video Game Design to Motivate Students. *Afterschool Matters*, (26), 18–26.	1	0	0	0	0	0	0	1
33. France, B., & Bay, J. L. (2010). Questions Students Ask: Bridging the gap between scientists and students in a research institute classroom. *International Journal of Science Education*, *32*(2), 173–194.	1	0	0	0	0	0	0	1
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.	0	0	0	0	0	0	0	1
38. 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.	1	1	1	0	0	0	0	1
40. 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.	0	0	1	0	0	0	1	0
41. 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.	0	0	1	0	0	0	0	0
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.	0	0	1	0	0	0	0	0
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.	1	1	1	0	1	1	0	1
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.	1	0	0	1	0	0	0	0
45. 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.	0	0	1	0	0	0	0	0
48. 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.	0	0	1	0	1	0	0	0
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.	1	0	0	0	0	0	0	0
52. Heilbronner, N. N. (2013). The STEM Pathway for Women. *Gifted Child Quarterly*, *57*(1), 39–55.	0	0	0	0	0	0	0	1
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.	1	1	0	1	1	0	0	1
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.	0	1	0	1	0	0	0	0
59. 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.	0	0	0	0	0	0	0	0
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.	0	0	1	0	0	0	0	0
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.	0	1	0	1	0	0	0	0
71. 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	0	0	0	0	0

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.	1	0	0	0	0	1	0	1
80. 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.	1	0	0	1	0	0	0	1
81. 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.	1	0	0	0	0	0	0	1
85. 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.	0	0	1	0	0	0	0	1
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.	0	1	0	1	0	0	0	1
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.	0	0	0	1	0	0	0	1
97. Prokop, P., Prokop, M., & Tunnicliffe, S. D. (2007). Is biology boring? Student attitudes toward biology. *Journal of Biological Education*, *42*(1), 36–39.	1	0	0	0	0	0	0	0
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.	0	1	0	0	0	0	0	0
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.	1	0	1	0	0	0	0	1
102. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engagement Using Observational Methods. *Educational Psychologist*, *50*(1), 58–69.	1	0	0	0	0	0	0	0
109. Schiefele, U., & Csikszentmihalyi, M. (1994). Interest and the Quality of Experience in Classrooms. *European Journal of Psychology of Education*, *9*(3), 251–270.	1	1	0	1	0	0	1	1
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 high-school students' interest in the natural sciences. *International Journal of Science Education*, *38*(5), 814–841.	0	1	1	0	0	0	0	0
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.	0	1	1	0	0	0	0	1
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.	1	2	0	0	0	0	0	0
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.	0	1	0	1	0	0	0	1
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.	0	0	0	0	0	0	0	1
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.	0	0	0	0	0	0	0	1

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**
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.	0	1	0	0	1	0	1	0	0	0	0	1	0	1
2. 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.	0	1	0	0	1	0	1	0	0	0	0	1	0	0
5. 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.	0	1	0	1	0	Schreiner, C., & Sjøberg, S. (2004). *Sowing the seeds of ROSE. Background, rationale, questionnaire development and data collection for the ROSE (The relevance of science education): A comparative study of students' views of science and science education. Acta Didactica*. Oslo.	0	1	0	0	0	0	0	1
6. 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	0	0	0	0	0	0	0	0	0	0	0
7. 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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
8. 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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	1	0	0	1	0	0	0	1	0	0	0	0	0
11. 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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	0	1	0	1	0	0	0	1	0	0	0	0	0
13. 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.	0	1	0	0	1	0	1	0	0	0	0	0	1	0
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 Self-Generated Questions. Research in Science Education, 42(3), 469–489.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
16. Çetin, G. (2014). Prospective Teachers' Views about Video-Enhanced General Biology Instruction. Educational Research and Reviews, 9(22), 1182–1199.	1	0	0	0	0	0	0	0	0	0	0	0	0	0

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.	0	0	1	1	0	Jones, B. D. (2012). *User guide for assessing the components of the MUSIC Model of Academic Motivation.* Retrieved from http://www.theMUSICmodel.com	0	0	1	0	0	0	0	0
21. 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.	0	0	1	1	0	Russell, J., & Hollander, S. (1975). A Biology Attitude Scale. *Source: The American Biology Teacher*, *37*(5), 270–273. doi:10.2307/4445229	0	1	0	0	0	0	1	0
22. 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.	0	0	1	0	1	0	0	0	1	0	0	0	0	0
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.	0	1	0	0	1	0	1	1	0	0	0	1	0	0
26. Dohn, N. B. (2011). Situational interest of high school students who visit an aquarium. Science Education, 95(2), 337–357.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
27. 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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
28. 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.	0	0	1	0	1	0	0	1	0	0	0	0	1	0
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.	0	1	0	0	1	0	0	0	0	0	1	0	0	0
30. Erten, S. (2008). Interests of 5th Through 10th Grade Students Toward Human Biology. H. U. Journal of Education, 35(1992), 135–147.	0	1	0	1	0	Finke, E., & Klen, R. (1999). Intressen an Humanbiologie in der Sekundarstufe. In *Bayrhube, H. u.a.(Hrsg.): Biologie und Bilding*. Kiel: IPN 350-354	0	1	0	*0*	*0*	*0*	0	*1*
31. Evans, M. A., Jones, B. D., & Akalin, S. (2017). Using Video Game Design to Motivate Students. Afterschool Matters, (26), 18–26.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
33. France, B., & Bay, J. L. (2010). Questions Students Ask: Bridging the gap between scientists and students in a research institute classroom. International Journal of Science Education, 32(2), 173–194.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	1	0	1	0	Gafoor, K. A., & Smitha, N. (2008). *Scale of Interest in Science (SIS)*. University of Calicut.	0	1	0	0	0	1	0	0
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.	0	1	0	0	1		0	0	0	1	0	0	0	0
38. 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.	0	0	1	0	1	0	0	0	1	0	0	0	0	0
39. Green, S., & Smith, J. (2005). Small Things Draw Big Interest. Science and Children, 42(4), 30–34.	0	0	1	0	1	0	0	0	0	0	1	0	0	0
40. 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.	0	0	1	0	1	0	0	1	0	0	0	1	0	0

41. 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.	0	0	1	0	1	0	0	0	1	0	0	0	0	0
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.	0	0	1	0	1	0	0	0	1	0	0	0	0	0
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.	0	1	0	1	0	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. doi:10.1007/s11165-010-9182-5	0	1	0	0	0	1	0	0
47. Harrison, M., Dunbar, D., Ratmansky, L., 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.	0	0	1	0	1	0	1	0	0	0	0	1	1	0
48. 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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	1	0	1	1	0	1	0	0	0	0	1	0	0
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.	0	1	0	1	0	Miller-Friedmann, J., & Sonnert, G. (2009). *Project PRiSE: Persistence Research in Science and Engineering*. Retrieved from https://www.cfa.harvard.edu/sed/projects/PRiSE_survey_proof.pdf	0	1	0	0	0	1	0	0
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.	0	1	0	1	0	Linnenbrink-Garcia, L., Durik, A. M., Conley, A. M., Barron, K. E., Tauer, J. M., Karabenick, S. A., & Harackiewicz, J. M. (2010). Measuring Situational Interest in Academic Domains. *Educational and Psychological Measurement*, *70*(4), 647–671. doi:10.1177/0013164409355699	0	0	0	1	0	0	0	0
52. Heilbronner, N. N. (2013). The STEM Pathway for Women. Gifted Child Quarterly, 57(1), 39–55.	0	0	1	0	1	0	1	0	0	0	0	0	0	0
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.	0	1	0	0	1	0	1	0	0	0	0	1	0	0
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.	0	1	0	1	0	Schiefele, U., & Krapp, A. (1996). Topic interest and free recall of expository text. *Learning and Individual Differences*, *8*(2), 141–160. doi:10.1016/S1041-6080(96)90030-8	0	1	0	1	0	1	0	0
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.	0	1	0	0	1	0	1	0	0	0	0	1	0	0
59. 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.	0	1	0	0	1	0	0	1	0	0	0	1	0	0
60. 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.	0	1	0	0	1	0	1	0	0	0	0	1	0	0
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.	0	1	0	0	1	0	1	0	0	0	0	0	0	1

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.	0	1	0	0	1	0	1	0	0	0	0	1	0	0
66. Kelly, A. (1988). The Customer is Always Right...Girls' and Boys' Reactions to Science Lessons. The School Science Review, 69(249), 662–676.	0	1	0	1	0	Kelly, A., Whyte, J., & Smail, B. (1984). *Girls Into Science and Technology: Final Report*.	0	1	0	0	0	0	1	0
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.	0	0	1	0	1	0	1	0	0	0	0	0	0	1
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.	0	1	0	1	0	Derya ATİK, A., Kayabaşi, Y., Yağci, E., Ünlü Erkoç, F., & Tarihi, B. (2015). Ortaöğretim Öğrencilerinin Biyoloji Bilimine ve Dersine Yönelik Tutum Ölçeği: Geçerlik ve The 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/biyoloji-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	0	1	0	0	0	0	1	1
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.	0	1	0	0	1	0	0	1	0	0	0	0	0	1
71. 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	Bauhardt, V. (1990). *Die Vera¨nderung der 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
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.	0	0	1	1	1	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	1	1	0	0	0	1	1	0
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.	0	1	0	1	0	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).	1	0	0	0	0	1	1	0
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.	0	1	0	0	1		0	0	1	0	0	0	0	0
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.	0	0	1	1	0	Larson, R., & Csikszentmihalyi, M. (1983). The Experience Sampling Method. *New Directions for Methodology of Social & Behavioral Science*, *15*, 41–56.	*0*	*0*	1	*0*	*0*	*0*	*0*	*0*
76. Laut, J., Bartolini, T., & Porfiri, M. (2015). Bioinspiring an Interest in STEM. IEEE Transactions on Education, 58(1), 48–55.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
77. 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.	0	1	0	0	1	0	1	0	0	0	0	1	0	0

80. 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.	0	1	0	1	0	Linnenbrink-Garcia, L., Durik, A. M., Conley, A. M., Barron, K. E., Tauer, J. M., Karabenick, S. A., & Harackiewicz, J. M. (2010). Measuring Situational Interest in Academic Domains. *Educational and Psychological Measurement*, *70*(4), 647–671. doi:10.1177/0013164409355699	0	0	0	1	0	0	0	0
81. 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.	0	1	0	1	0	Rotgans, J. I., & Schmidt, H. G. (2011). Situational interest and academic achievement in the active-learning classroom. *Learning and Instruction*, *21*(1), 58–67. doi:10.1016/j.learninstruc.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.	0	0	1	0	1	0	0	0
85. 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.	0	1	0	1	0	Deci, E. L., & Ryan, R. M. (n.d.). selfdeterminationtheory.org – Intrinsic Motivation Inventory (IMI). Retrieved December 17, 2018, from http://selfdeterminationtheory.org/intrinsic-motivation-inventory/	0	0	1	0	0	0	0	0
86. 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.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	1	0	0	1	0	1	0	0	0	0	0	0	0
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.	0	1	0	1	0	Wild, E., Hofer, M., & Pekrun, R. (2006). Psychologie des Lernens. In A. Krapp & B. Weidenmann (Eds.), *Pädagogische Psychologie* (pp. 203-268). Weinheim: PVU.	0	0	0	0	1	0	0	0
93. Nyberg, E., & Sanders, D. (2014). Drawing attention to the 'green side of life.' Journal of Biological Education, 48(3), 142–153.	0	1	0	0	1	0	1	0	0	0	0	0	1	0
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.	0	1	0	0	1	0	0	0	1	0	0	0	0	0
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.	0	0	1	0	1	0	0	1	0	0	0	0	1	0
97. Prokop, P., Prokop, M., & Tunnicliffe, S. D. (2007). Is biology boring? Student attitudes toward biology. Journal of Biological Education, 42(1), 36–39.	0	0	1	0	1	0	0	0	1	0	1	0	0	0
98. Prokop, P., Tuncer, G., & Chudá, J. (2007). Slovakian Students' Attitudes toward Biology. Eurasia Journal of Mathematics, Science and Technology Education, 3(4), 287–295.	0	1	0	0	1	0	0	0	1	0	0	0	0	0
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.	0	1	0	1	1	Laukenmann, M., Bleicher, M., Fu, S., Gläser-Zikuda, M., Mayring, P., & von Rhöneck, C. (2003). An investigation of the influence of emotional factors on learning in physics instruction. *International Journal of Science Education*, *25*(4), 489–507. doi:10.1080/09500690210163233	0	0	1	0	0	0	0	1
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.	0	1	0	1	0	Löwe, B. (1987). Interessenverfall im Biologieunterricht. *Unterricht Biologie, 11* (124), 62-65.	0	0	0	0	1	0	0	0
102. Renninger, K. A., & Bachrach, J. E. (2015). Studying Triggers for Interest and Engagement Using Observational Methods. *Educational Psychologist*, *50*(1), 58–69.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0

106. Ryu, M. (2015). Understanding Korean Transnational Girls in High School Science Classes: Beyond the Model Minority Stereotype. *Science Education*, *99*(2), 350–377.	1	0	0	0	0	0	0	0	0	0	0	0	0	0
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.	0	1	0	1	0	Romine, W., Sadler, T. D., Presley, M., & Klosterman, M. L. (2014). Student Interest in Technology and Science (SITS) Survey: Development, Validation, and Use of a New Instrument. *International Journal of Science and Mathematics Education*, *12*(2), 261–283. doi:10.1007/s10763-013-9410-3	0	0	1	0	0	0	0	0
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