

STEM Toolkit Item List

1. "STEM Introductory Video" → Video with instructions on how to use tool kit and narration of PowerPoint.
2. "STEM Presentation" → Slide show that explains what STEM is and how to implement it successfully.
3. "STEM Article Annotations" → An annotated summary of several peer-reviewed articles on STEM.
4. "STEM Design Sheet" Folder → Contains a research-based STEM design sheet and student examples to assist in the implementation of engineering activities.
5. "Maker Based Instruction" Documents → SMU Maker Project items to assist in designing maker-based activities.
6. "Sample Student Feedback" → 2021 Student survey responses following STEM based curriculum

Questions? Email acompton@miami.edu

This toolkit was designed by Angela Compton for the SEALED data repository.

References

- Beckett, G.H., Hemmings, A., Maltbie, C., Wright, K., and Sherman, M. (2015). An evaluation study of the CincySTEM ITEST projects: Experience, peer support, professional development and sustainability. *Journal of STEM Teacher Education*, 50 (1), p. 3-17.
- Bicer, A. and Capraro, R.M. (2019). Mathematics achievement in the secondary high school context of STEM and non-STEM schools. *School Science and Mathematics*.
- Christensen, R., Knezek, G., and Tyler-Wood, T. (2015). Alignment of hands-on STEM engagement activities with positive STEM dispositions in secondary school students. *Journal of Science Education and Technology*, 24, p. 898-909. DOI <https://doi.org/10.1007/s10956-015-9572-6>
- Duncan-Andrade, J.M., and Morrell, E. (2008). The art of critical pedagogy: Possibilities for moving from theory to practice in urban schools. *Counterpoints*, 285, p. 23-48.
- Eisenkraft, A. and Freake, S.C. (Eds.). (2018). *Beyond the Eggdrop: Infusing engineering into high school physics*. NSTA Press
- Fredricks, J.A., Wang, M., Linn, J.S., Hofkens, T.L., Sung, H., Parr, A., and Allerton, J. (2016). Using qualitative methods to develop a survey measure of math and science engagement. *Learning and Instruction*, 43, p. 5-15.
- Hall, A. and Miro, D. (2016). A study of student engagement in project-based learning across multiple approaches to STEM education programs. *School Science and Mathematics*, 116 (6), p. 310-319.

Honey, M., Pearson, G., & Schweingruber, H. (2014). *STEM integration in K-12 education: Status, prospects, and an agenda for research*. The National Academies Press. (Free download available at: <http://www.nap.edu/catalog/18612/stem-integration-in-k-12-education-status-prospects-and-an>)

Lenz, B. (2015). *Transforming schools using project based assessment and Common Core Standards*.

Malkiewich, L.J. and Chase, C.C. (2019). What's your goal? The importance of shaping the goals of engineering tasks to focus learners on the underlying science. *Instructional Science*, 47, p. 551-558. DOI: <https://doi.org/10.1007/s11251-019-09493-2>

SMU Maker Education Project. (2018). *STEM Engineering Template*. Southern Methodist University. Retrieved October 24, 2018, from <http://smumakeredproject.org/>. NO LONGER AVAILABLE.

Toshalis, E. (2015). *Make me!: Understanding and engaging student resistance in school*. Harvard Education Press.