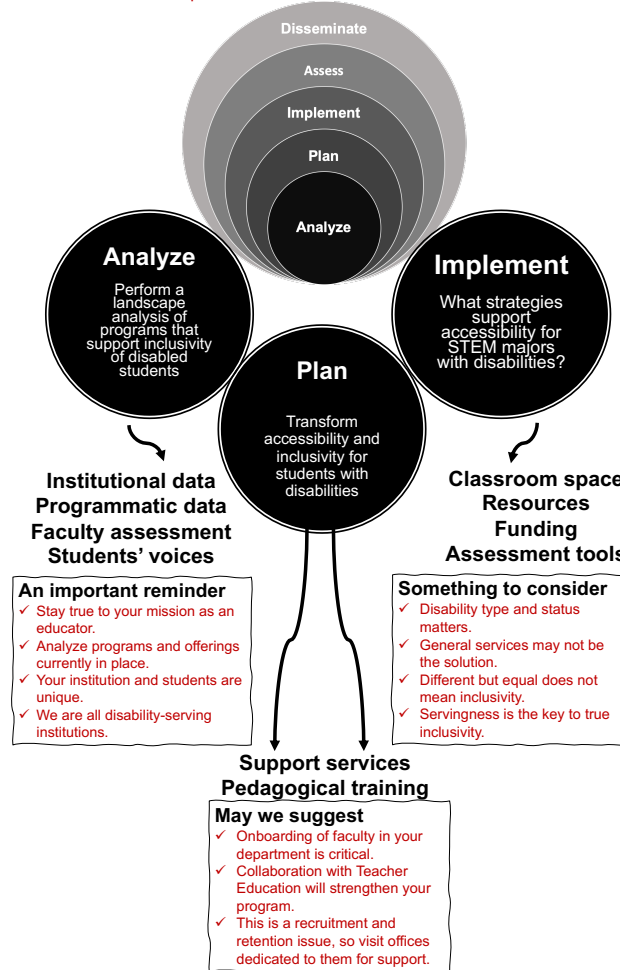


STEM Accessibility, Empowerment, & Student Success

Find tips and resources that will help you develop programs and curricula that will improve educational outcomes and facilitate full accessibility for students with disabilities in STEM. This resource is targeted for those at institutions without STEM-specific services for students with disabilities.



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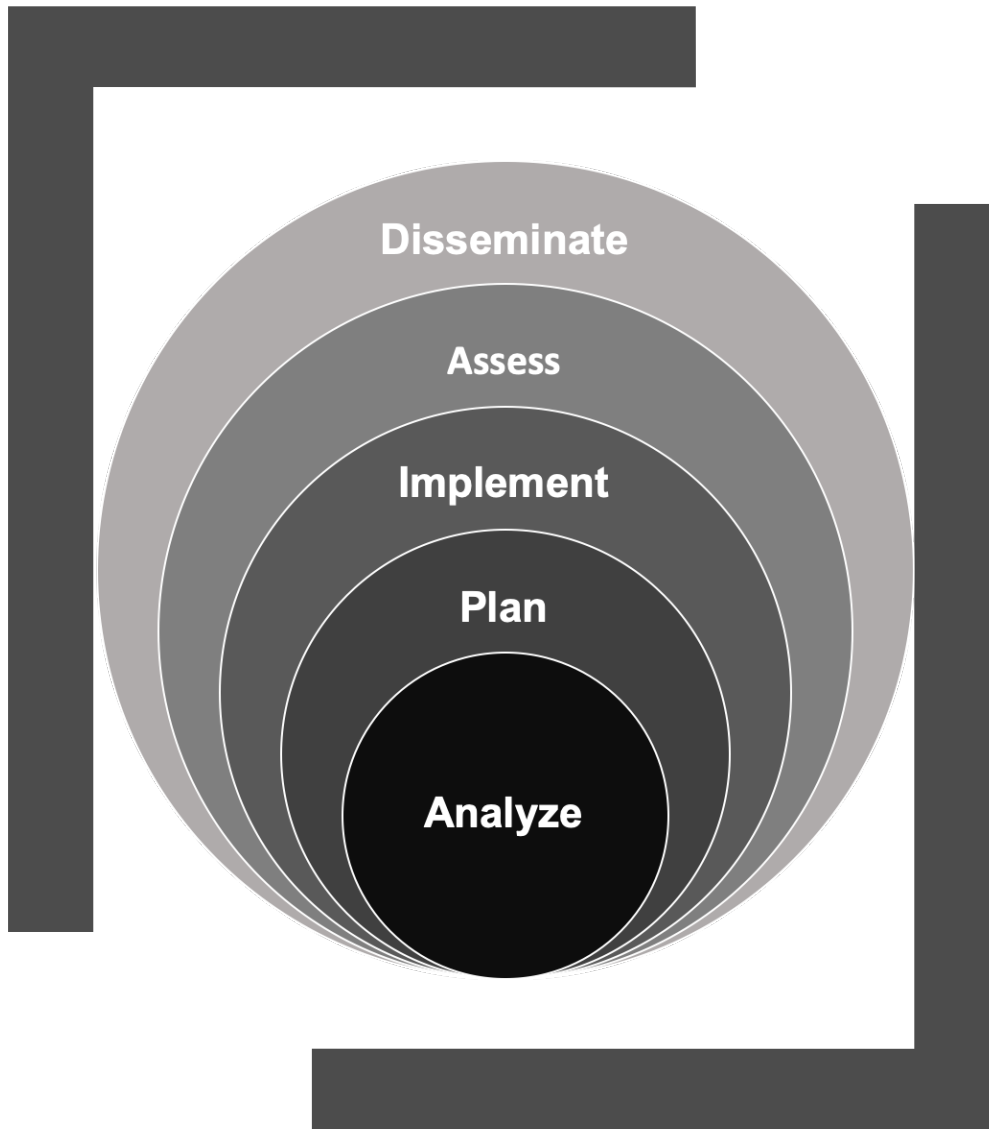
Bernadette Connors, PhD (May 2020)

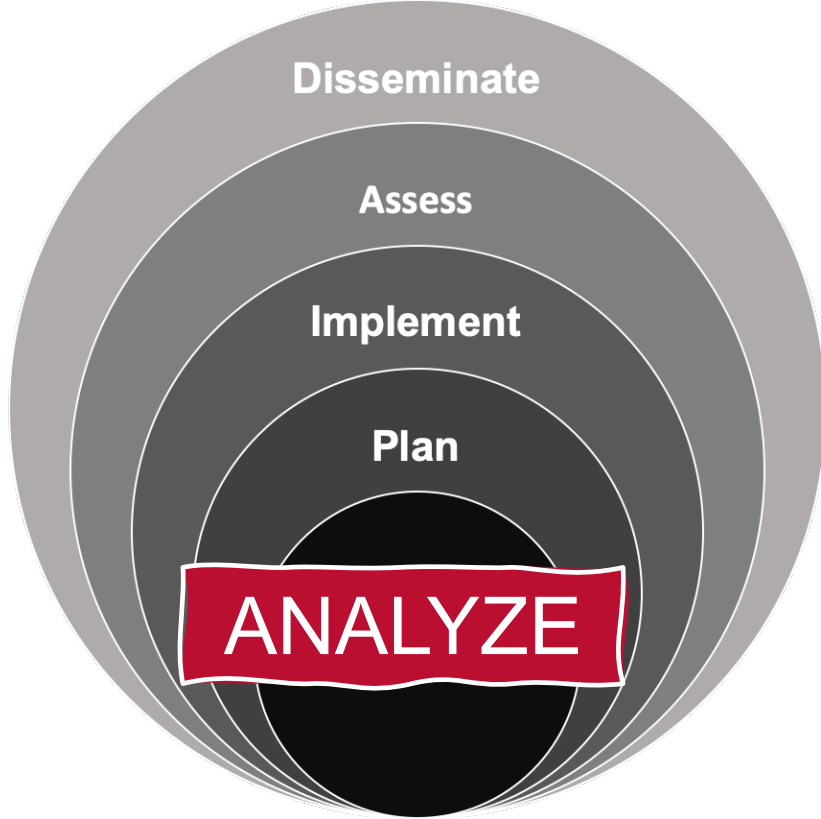
STEM Accessibility, Empowerment, and Student Success

This resource is designed to help you find tips on how to discover resources that can be used to develop programs and curricula that will improve educational outcomes and facilitate full accessibility for students with disabilities in STEM.

Find tips and resources that will help you:

- ✓ Analyze programs and offerings currently in place at your institution
- ✓ Plan a program or revise curricula that will serve your unique STEM student population
- ✓ Implement these activities in STEM
- ✓ Assess the effectiveness of these offerings
- ✓ Disseminate your results to broader academic community





A must read...

Thurston, L. P. et al. (2017).
Postsecondary STEM Education for
Students with Disabilities: Lessons
Learned from a Decade of NSF
Funding. *Journal of Postsecondary
Education and Disability*, 30(1), 49-60.

Institutional data

- ✓ Recruitment materials
- ✓ Retention data
- ✓ Graduation rates
- ✓ Demographic data per program
- ✓ Majors that support student with disabilities
- ✓ Disability support services

Programmatic data

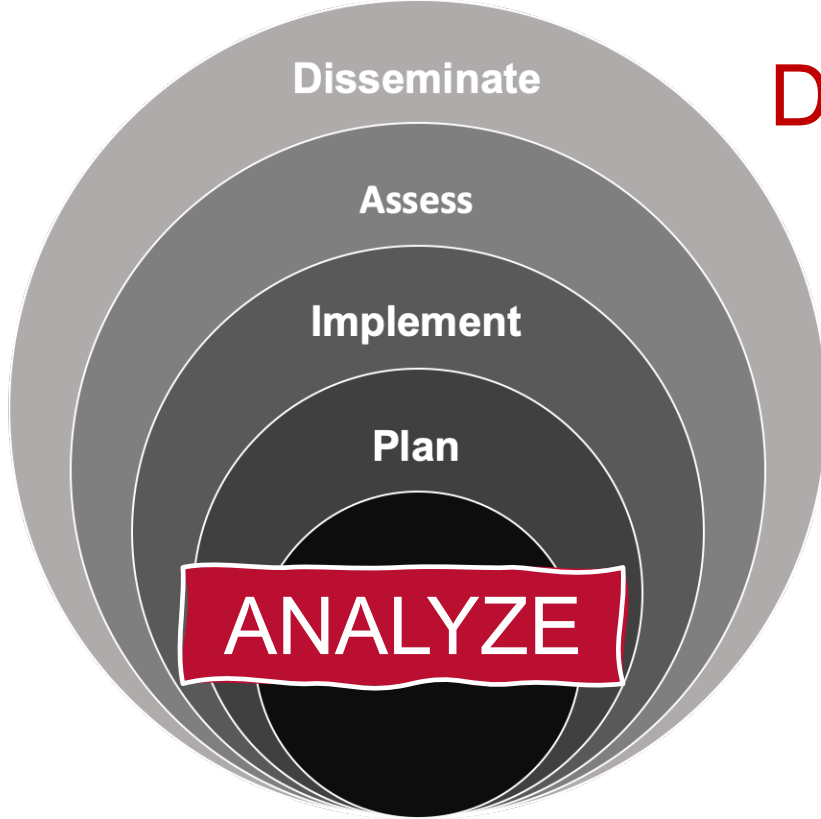
- ✓ Student learning outcomes
- ✓ GPA anomaly data for students with disabilities
- ✓ Persistence within the major
- ✓ Support of students with disabilities in STEM and non-STEM programs

Faculty assessment and evaluation

- ✓ Faculty willingness to provide accommodations
- ✓ Professional development and pedagogical training experiences
- ✓ Faculty experiences in creating inclusive spaces (next slide)
- ✓ Faculty satisfaction with Special Services program

Students' voices

- ✓ Persons with disabilities self-assessment tool
- ✓ Course evaluations
- ✓ Student satisfaction with Special Services



Determine the current state of accessibility for STEM majors with disabilities

How have you created an inclusive *classroom environment* for students with disabilities?

How have you created an inclusive *laboratory environment* for students with disabilities?

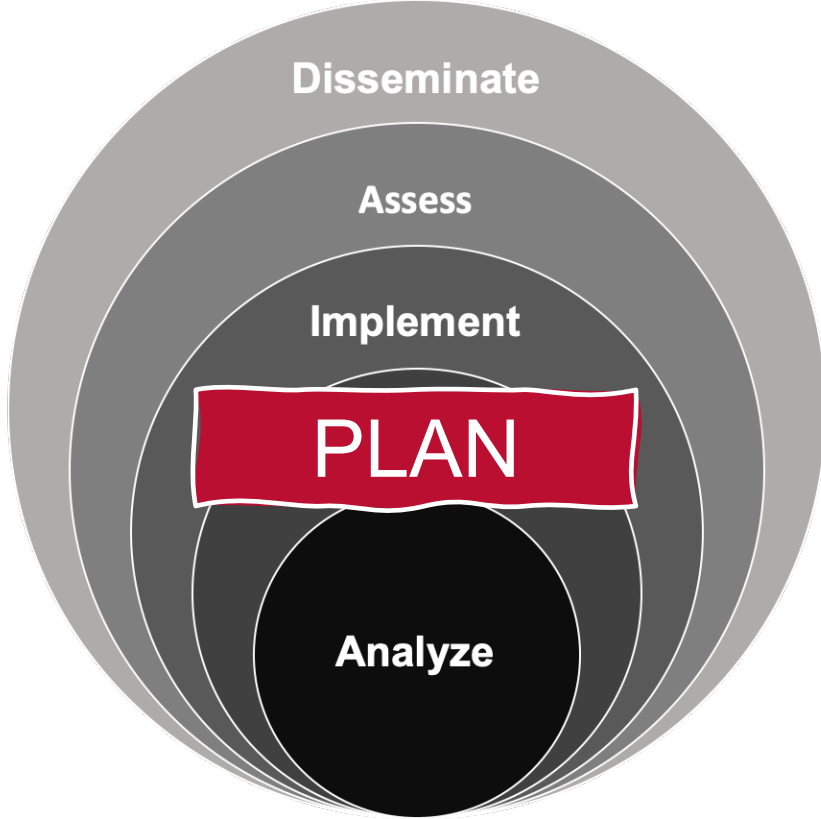
How have you created an inclusive *research environment* for students with disabilities?

In creating these inclusive spaces, have you made any of these connections?

- ✓ Contacted a special services professional at your own institution
- ✓ Connected with a professional outside of your own institution
- ✓ Sought out professional development workshops and seminars

Something to think about...

Mamboleo, G. et al. (2015). Students with Disabilities' Self-Report on Perceptions toward Disclosing Disability and Faculty's Willingness to Provide Accommodations. *Rehabilitation counselors and educators journal*, 8(2), 8.



Transform accessibility and inclusivity for students with disabilities

Are there designated support services for your students who identify as disabled?

- ✓ Are there specialized support services for STEM students?
- ✓ Are there specialized support services for STEM students *with disabilities*?

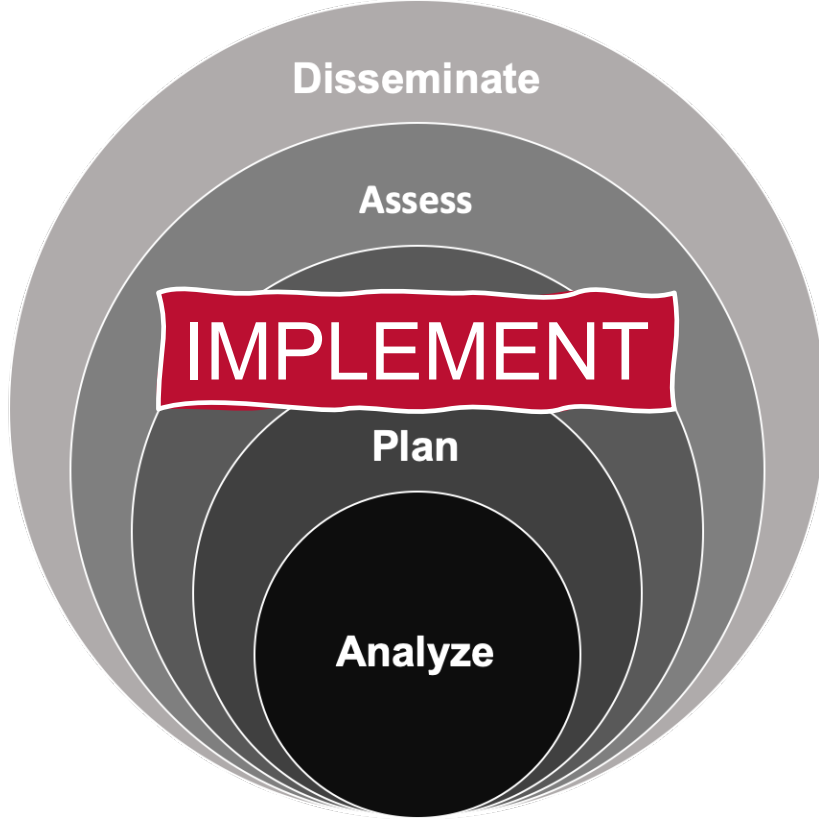
What types of pedagogical training are offered for faculty at your institution?

- ✓ Are there specialized support services for STEM faculty?
- ✓ Is training offered for faculty to support their teaching and mentoring of STEM students *with disabilities*?

May we suggest

- ✓ Onboarding of faculty in your department is critical.
- ✓ Collaboration with Teacher Education will strengthen your program.
- ✓ This is a recruitment and retention issue, so visit offices dedicated to them for support.

What strategies support accessibility for STEM majors with disabilities?



Something to consider

- ✓ Disability type and status matters.
- ✓ General services may not be the solution.
- ✓ Different but equal does not mean inclusivity.
- ✓ Servingness is the key to true inclusivity.

To help create an inclusive ***classroom space*** for students with disabilities, you might consider these active learning approaches:

- ✓ Problem-based learning
- ✓ Flipped classroom
- ✓ Community-based learning
- ✓ Role play

To help create an inclusive ***classroom-laboratory and research space*** for students with disabilities, you might consider these approaches:

- ✓ Large print resources
- ✓ Living document of your collaboration with student
- ✓ Variable height desks
- ✓ Use of digital photo documentation
- ✓ VR to help students learn techniques
- ✓ Group labs

IMPLEMENT

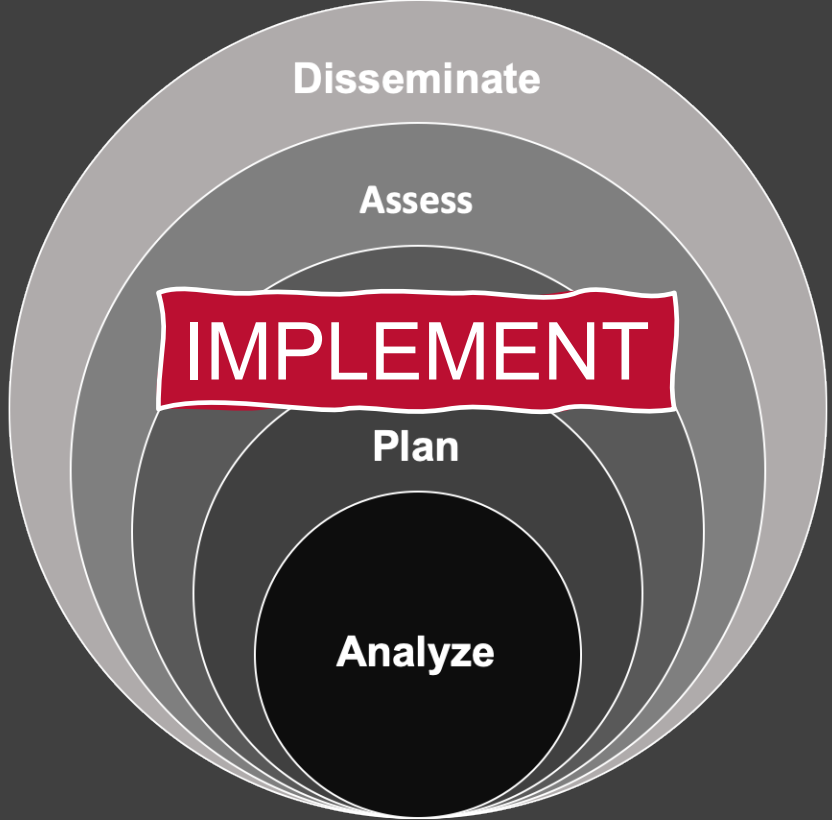
Resources: Accommodations

- ✓ test taking accommodations, such as extended time, calculators, readers, use of laptops
- ✓ note takers or scribes
- ✓ tape and visual recording of lectures
- ✓ extended tutoring sessions
- ✓ assistive technology, such as text-to-speech programs
- ✓ course substitutions
- ✓ books and text in alternate formats
- ✓ physical accessibility to campus
- ✓ priority registration for coursework

IMPLEMENT

Resources: Online activities and labs

- ✓ HHMI Biointeractive (www.biointeractive.org/home)
- ✓ National Center for Case Study Teaching in Science (www.sciencecases.lib.buffalo.edu/cs/)
- ✓ Labster (www.labster.com)
- ✓ SimBio (www.simbio.com)
- ✓ PBS Learning Media (www.pbslearningmedia.org)
- ✓ Campus Compact Service Learning (www.nclid.org)
- ✓ Wildscreen Arkive (www.wildscreen.org)
- ✓ Prepmagic (www.prepmagic.com)
- ✓ Scitable (www.nature.com/scitable)
- ✓ NYS Department of Environmental Conservation (www.dec.ny.gov/education)
- ✓ iNaturalist (www.inaturalist.org)
- ✓ iCell (www.sciencenetlinks.com/tools/icell-app)
- ✓ Access Technology Higher Education Network (www.athenpro.org)
- ✓ Frog Virtual Dissection (www.frogvirtualdissection.com)
- ✓ Zygote Body (www.zygotebody.com)
- ✓ A.D.A.M Education (www.adameducation.com/aiaonline)
- ✓ Brainscape (www.brainscape.com)



Resources:

Online activities and labs

- University of Washington DO-IT program (www.washington.edu/doit/)
- Alabama State University Alabama Alliance for Students With Disabilities (www.alasu.edu/accessibility)
- Auburn University South East Alliance for Persons with Disabilities in STEM (cws.auburn.edu/apspi/pm/includes)
- HBCU Disability Consortium (www.blackdisabledandproud.org/)
- Coalition for Disability Access in Health Science Education (www.hsmcoalition.org/)
- National Center for College Students with Disabilities (www.nccsdonline.org/)
- Association on Higher Education and Disability (www.ahead.org/home)
- American Institutes for Research (www.air.org/)
- Think College National Coordinating Center (www.thinkcollege.net/)
- LD Online (www.ldonline.org/)
- University of New Hampshire Institute on Disability/UCECD (iod.unh.edu/)
- National Center for Learning Disabilities (www.nclد.org/)
- University of Massachusetts Amherst Center for Student Success Research (www.umass.edu/education/center/student-success)
- CAST (www.cast.org/)
- AAAS Entry Point! (www.aaas.org/programs/entry-point)
- Association of American Colleges and Universities (www.aacu.org/)
- Association for the Study of Higher Education (www.ashe.ws/)

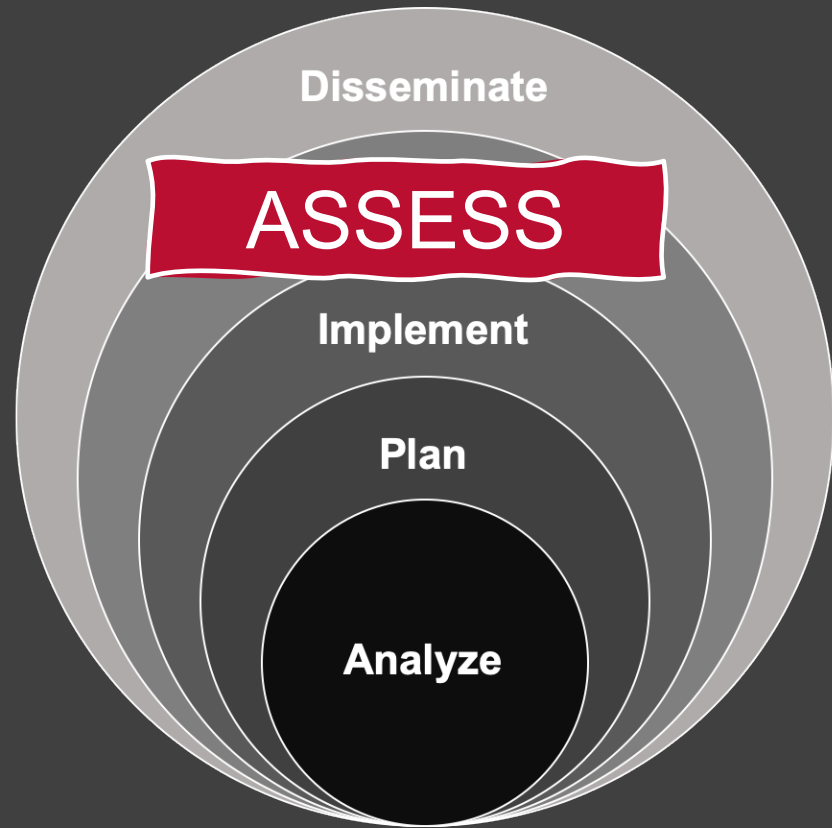
Funding Opportunities

- **Philanthropic organizations focused on supporting inclusive education**

- ✓ Spencer Foundation
- ✓ Lavelle Fund
- ✓ Booth Ferris Foundation
- ✓ Howard Hughes Medical Institute Inclusive Excellence
- ✓ Burroughs Welcome Fund
- ✓ Ford Foundation
- ✓ Alfred P. Sloan Foundation

- **State and federal funding to support inclusive education**

- ✓ National Science Foundation INCLUDES, IUSE
- ✓ Office of Special Education and Rehabilitative Services
- ✓ Department of Education (state)
- ✓ Jacob K. Javits Gifted and Talented Students Education Program



Resources

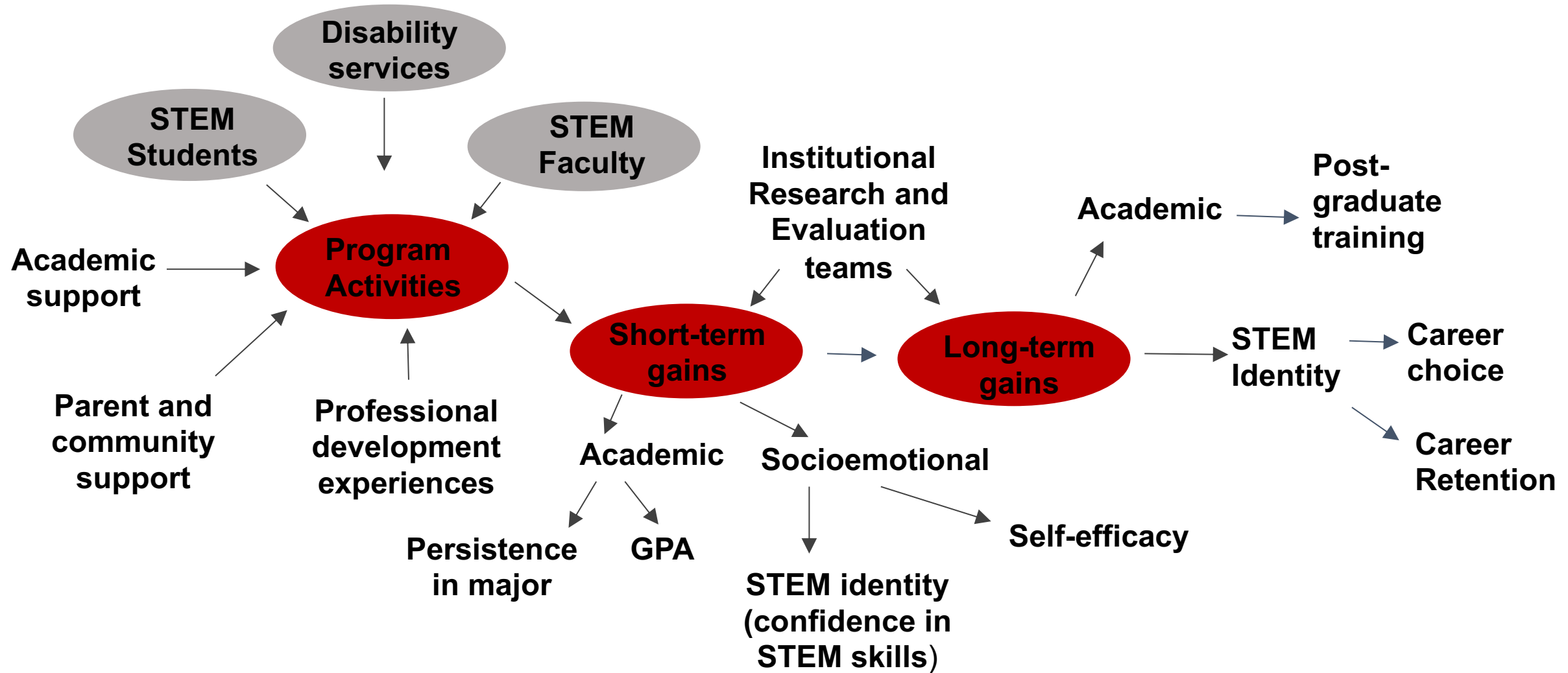
Important components to developing effective assessment and evaluations:

- ✓ Logic model
- ✓ Conceptual model
- ✓ Formative and summative assessments are included
- ✓ Project management team comprised of education professionals who can suggest changes based on evaluation
- ✓ Evaluators who have experience with both STEM and disabled population

Case studies can inform evaluation plans. Effective case studies have following attributes:

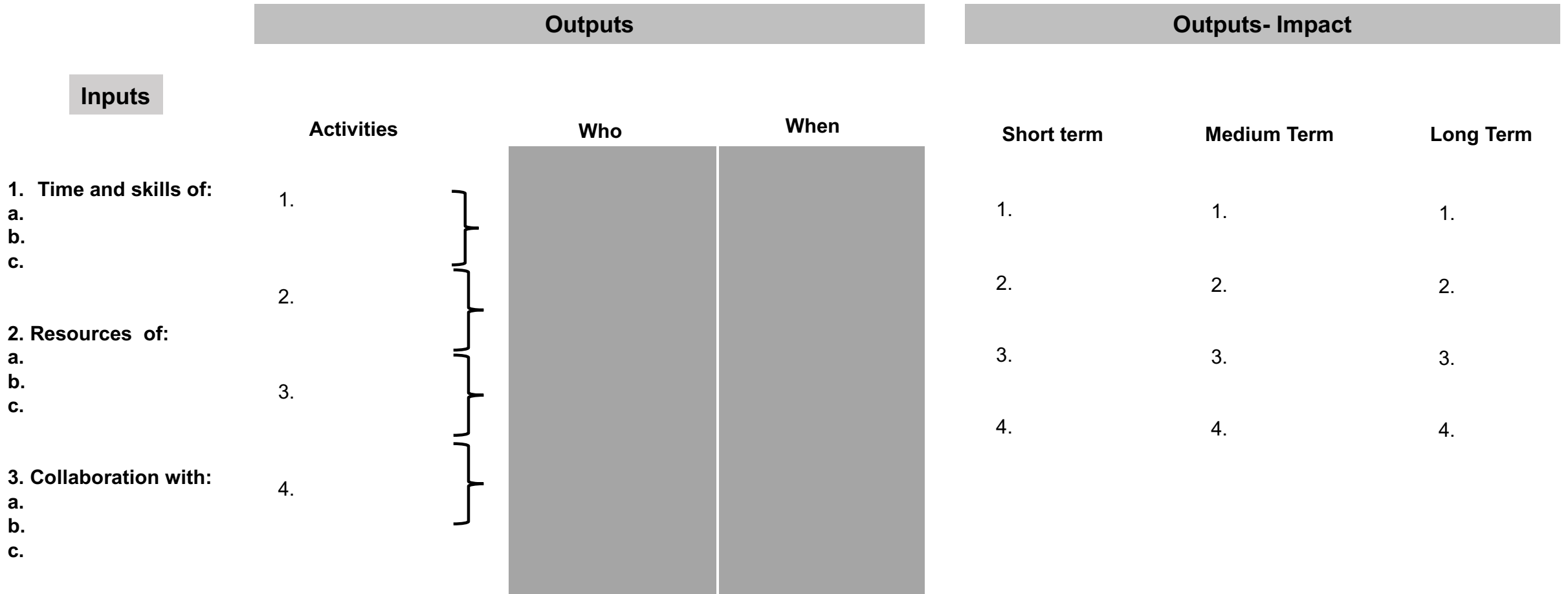
- ✓ Detailed background information is given
- ✓ Assessment of the problem is clear
- ✓ Plan for working with student population is presented and problems that might arise are detailed
- ✓ Possible interventions are offered, along with implications
- ✓ Evaluation of the intervention is the focus of any self-reflection

Conceptual model

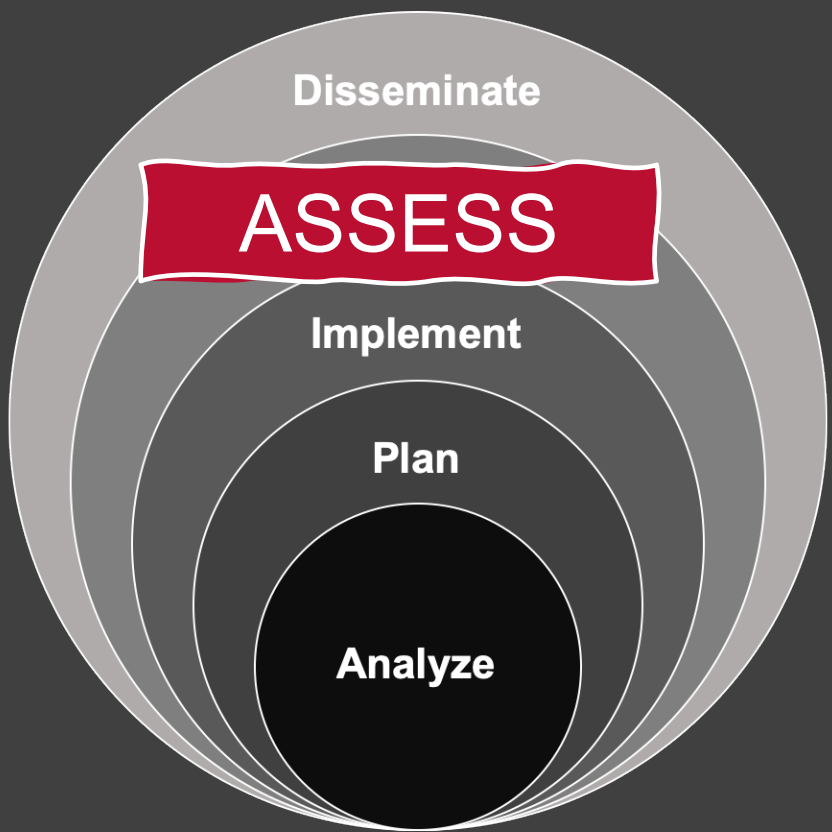


A conceptual model will guide your assessment and evaluation process. In the beginning phase and throughout the project, evaluators should work to refine evaluation methods, including data collection instruments and procedures, based on program logic model, timelines, and targets.

Logic model



A logic model will guide your overall development of innovations, especially at a programmatic level. It can also, however, inform how you approach developing new pedagogy at a smaller scale, such as in the classroom or laboratory.



Assessment and Evaluation Tools

- Classroom Observation Protocol for Undergraduate STEM (COPUS)
- Colorado Learning Attitudes about Science Survey (CLASS)
- Field-Tested Assessment Guide (FLAG)
- Academic Skills Inventory (Kruger and Zechmeister, 2001)
- Views About Science Survey (VASS)
- Views of Nature of Science Questionnaire (VNOS)
- AAAS Research Competitiveness Program (www.aaas.org/programs/research-competitiveness)
- AEFIS (www.aefis.com)
- Types of Assessment and Evaluation (www.tll.mit.edu/help/types-assessment-and-evaluation)
- Northeastern Center for Advancing Teaching and Learning Through Research (www.learning.northeastern.edu/programmaticassessment/)
- National Center for Education Statistics (www.ncses.edu/gov)
- Women, Minorities, and Persons with Disabilities in S&E (www.nsf.gov/statistics/women/#tabs-1)
- Integrated Postsecondary Education System (www.nces.ed.gov/ipeds/)

DISSEMINATE

Assess

Implement

Plan

Analyze

-
- *Journal of Postsecondary Education and Disability (JPED)*
 - *CourseSource*
 - *Journal of Science Education for Students with Disabilities (JSESD)*
 - *Equity and Excellence in Education*
 - *Journal of Learning Disabilities*
 - *CBE—Life Sciences Education*

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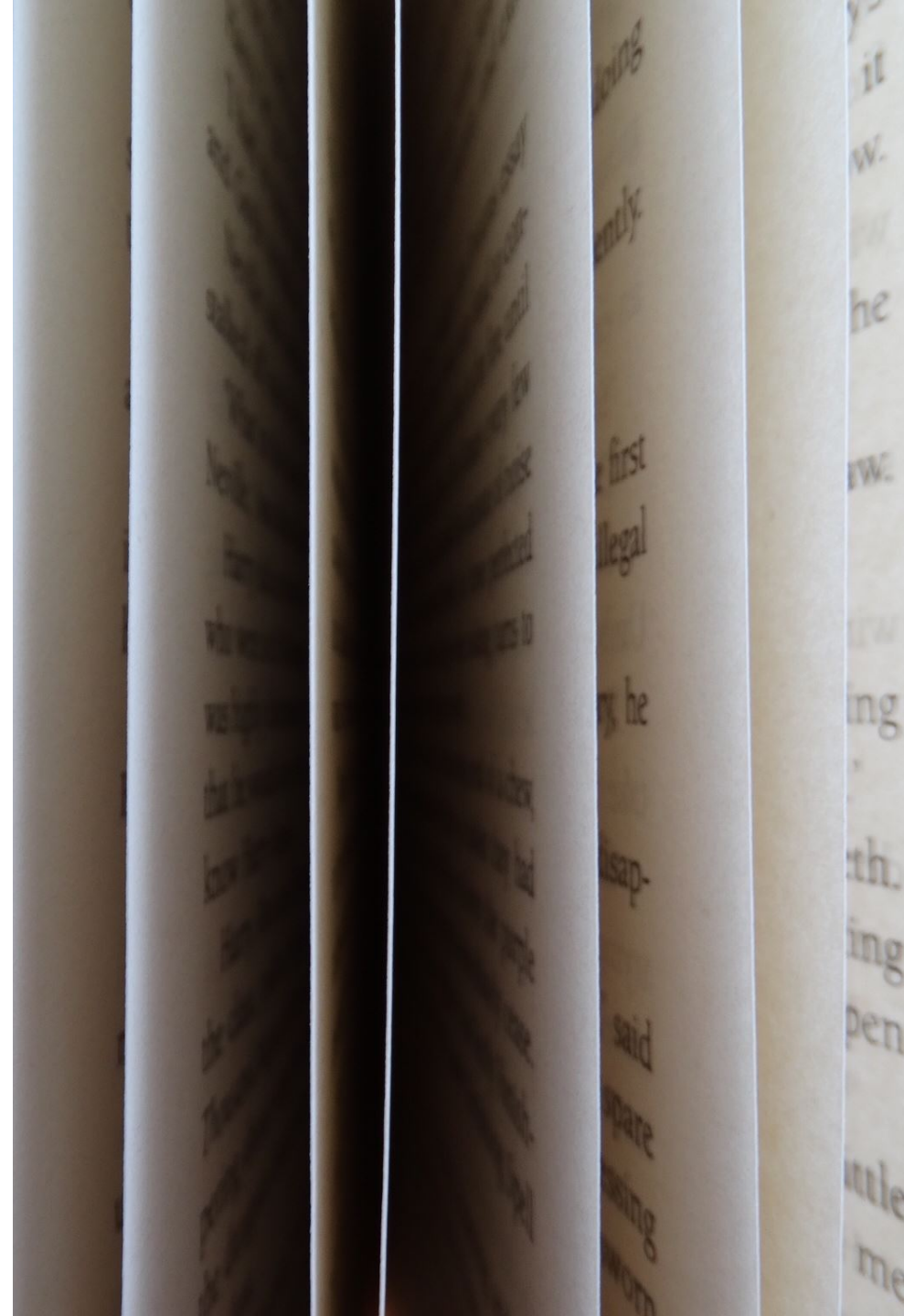
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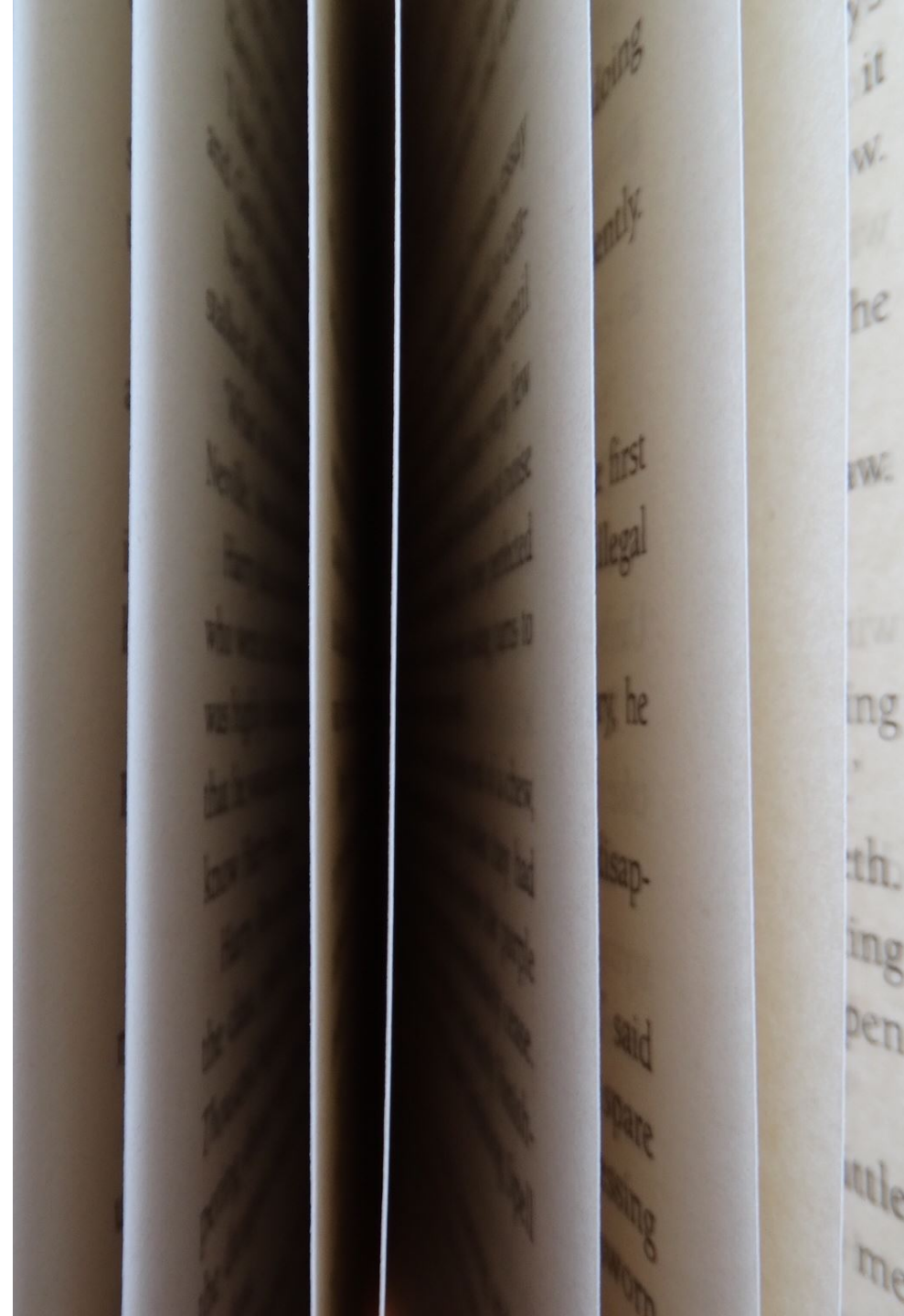
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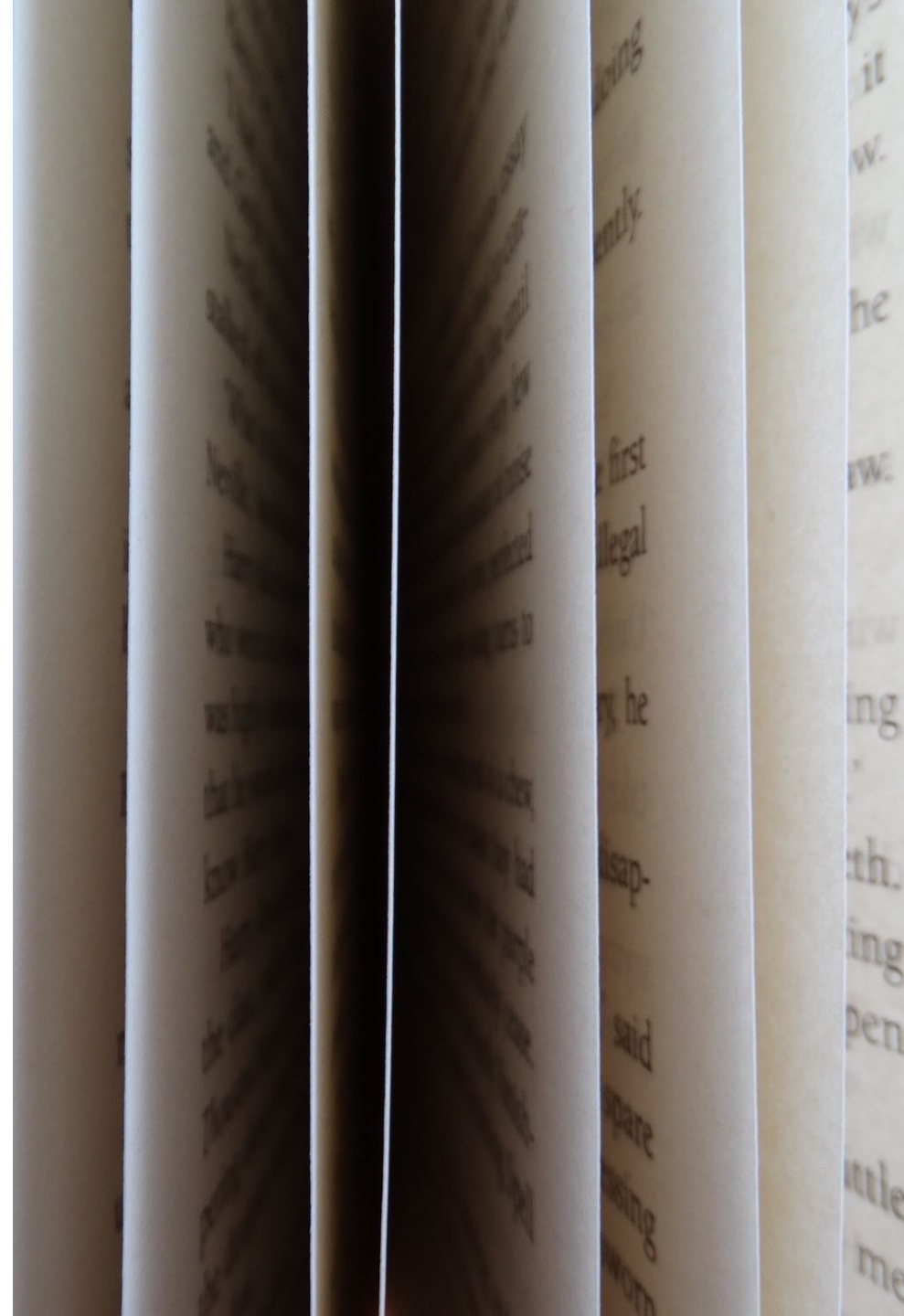
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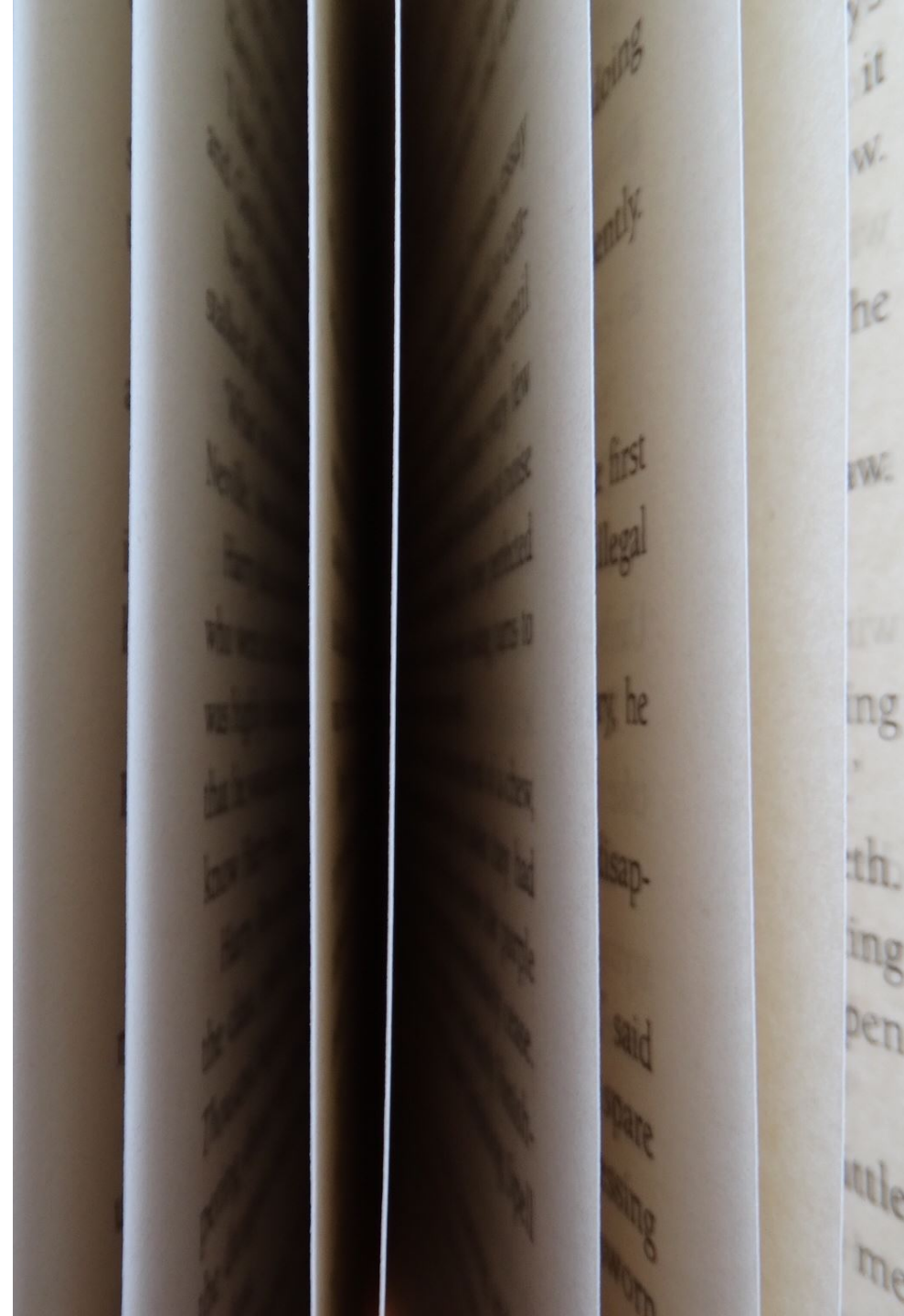
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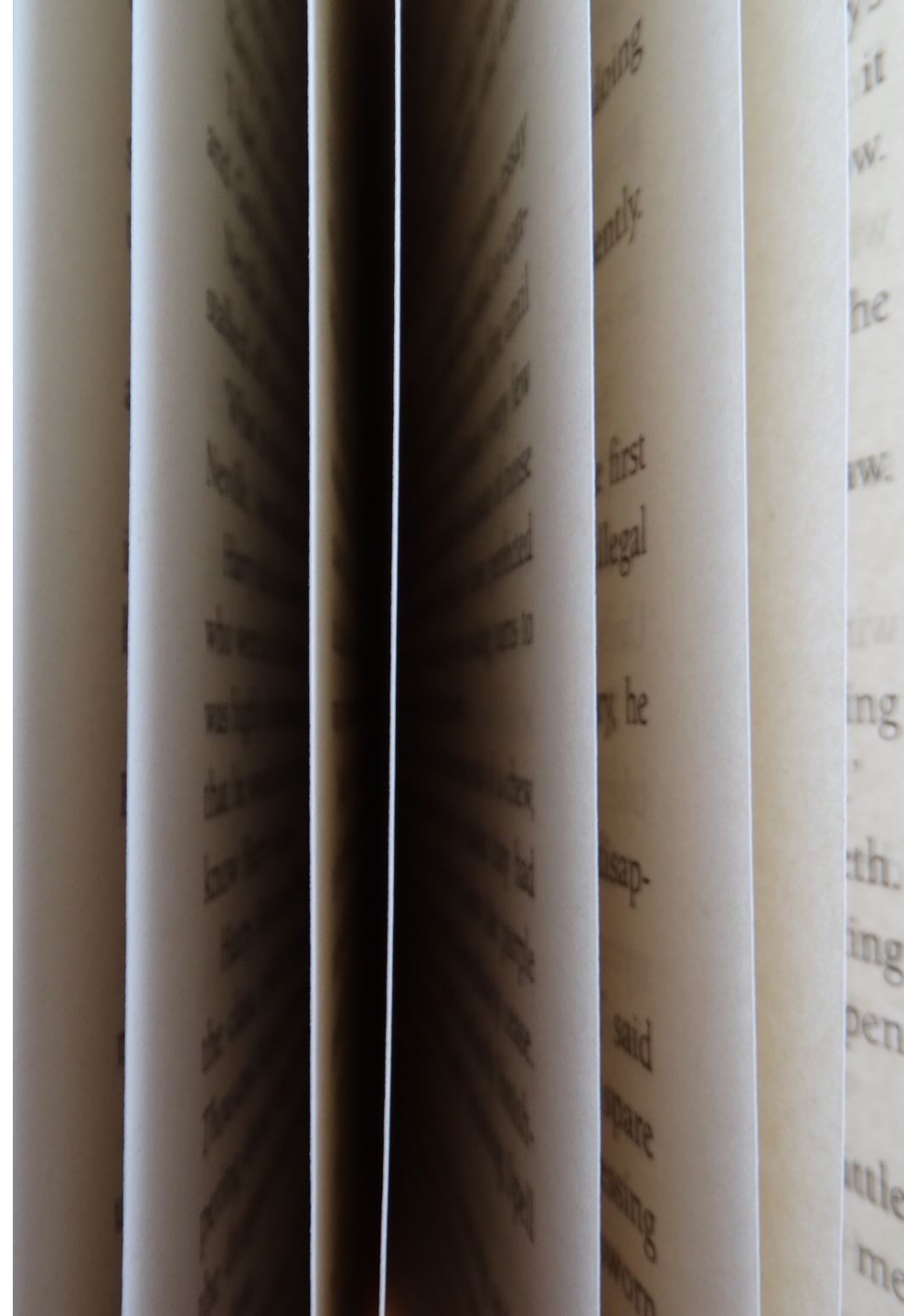
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