

“Open Homework Systems: Planning and Piloting Library Support”

Project Narrative

Project Justification

Introduction

The Penn State University Libraries, on behalf of the Public Services Directors of the libraries of the Big Ten Academic Alliance (BTAA), requests a grant of \$150,000.00 for a 2-year period to plan and pilot a library-led service model for supporting hosted, open source, online homework delivery systems as supplemental resources for teaching with open educational resources (OER). The BTAA Public Services Directors is a peer group of BTAA Library Initiatives, whose membership includes senior leaders from all fifteen of the world-class research libraries of the BTAA. The project proposed in this grant will be a joint project of the Public Services Directors. This project is intended to advance shared knowledge and learning opportunities for all students (IMLS Objective 1.1) and strengthen the ability of libraries to work collaboratively for the benefit of the communities we serve (NGL-L Goal 5). As the commercial textbook market continues to evolve, publishers have sought to increase profits by bundling textbooks with homework systems and expensive access code content.¹ While OER is an appealing alternative option to many faculty, without the convenience of an accompanying homework system, it is difficult to get widespread faculty buy-in. This project will produce findings that help libraries expand their OER programs to include support for open-source homework systems many faculty need in order to consider and adopt OER.

Problem Addressed

High-enrollment undergraduate courses in STEM and foreign language departments often use proprietary homework systems with commercial textbooks. Online homework systems (also known as courseware) provide faculty with key insights into student performance through interactive exercises, quizzes, and Learning Management System (LMS) integrations. The automation of student and instructor feedback make these products especially compelling options for departments that teach high-enrollment courses. Commercial textbook publishers often bundle online homework systems with their textbooks to simplify the textbook adoption process. Once adopted by an academic department, faculty are unlikely to consider OER alternatives – even when relevant, high-quality OER exist – because losing access to a homework system would make teaching high-enrollment courses significantly more difficult.

The cost of commercial courseware and homework systems is significant, and the business model presented by commercial publishers is to remove student access to the platforms/materials at the end of each term. In the 2021-2022 academic year, students at Northwestern University paid half a million dollars for courseware, averaging \$60 per student in each of the courses requiring courseware. More than 50 courses required courseware ranging in cost up to \$135. Unlike with printed textbooks, costs cannot be recouped by students for selling back the used materials when they’re finished, and they also don’t have an option to retain the materials for future reference. As instructor reliance on proprietary homework platforms increases, the number of students who forgo purchasing access codes due to cost has increased. As a result, from 17% in 2019 to 20% in 2020, beyond the half of BTAA institutions and commercial publishers, 5 (2021, February 24). *Fixing the Broken Textbook Market: Third Edition*. Student PIRG’s guide to Homework Systems, there is a list of centers for Textbook Market. This was stated in Student PIRG’s guide to <https://studentpirgs.org/2021/02/24/fixing-the-broken-textbook-market-third-edition/>

inclusive access programs, “With major textbook companies launching new apps and developing business strategies similar to Netflix or Amazon, the exploitation of students and faculty data raises legal, ethical, and strategic issues for institutions.”³ When homework systems are tied directly to student grading, their costs generally cannot be avoided or offset in the ways that students often employ to reduce textbook expenses, be it through resource-sharing, rentals, library loans, or other means. We believe it is essential that librarians support the creation of openly licensed alternatives to existing commercial homework systems as a way of enhancing existing OER offerings, expanding OER adoption and use, protecting student and faculty data, and ensuring students have access to equitable and inclusive learning environments.

Target Group and Beneficiaries

There are two target groups that will be most immediately positively impacted by our grant project: students and faculty within BTAA institutions. Initially, students within high-cost, high enrollment classes will reap the benefits of this work through the cost-savings and pedagogical impact that a fully open suite of course materials enables.

Faculty who are seeking alternatives to commercial homework systems, who desire greater levels of customization with their course materials, and/or who want to explore open pedagogy will benefit from the structure and incentives we will provide through the trial period. We plan to recruit between 9-12 faculty members in total from Penn State, the University of Minnesota, and Northwestern University to participate in a pilot of relevant open homework systems. They will receive librarian support and a small stipend to implement and test an open homework system. Depending on the faculty and courses that are identified to participate in the pilot, the number of impacted students will vary. When investigating which faculty to recruit for the pilot, we will target those that teach high-cost, high-enrollment courses in STEM and language fields.

In addition to the positive impact on students and faculty, we anticipate that our project will provide a model for BTAA libraries to expand the list of course material support services they offer to include access to open courseware and open homework systems. This extra layer of support could provide a foothold for OER creation and adoption in disciplines that would not consider it previously. Upon completion of the grant project, the insights we gather will be available for any institution to learn from and replicate.

Past & Current Work on Open Homework Systems

The two projects we will learn from and build upon are BCcampus’s [Open Homework Systems Project](#), and VIVA’s IMLS-funded project [An Open Homework Repository to Aid Adoption Efforts in Open Education](#).

BCcampus’s project laid the groundwork and created a model for exploring and analyzing open-source homework systems with the goal to “Replace high-use, high-cost commercial homework systems used within the B.C. post-secondary system with open-source alternatives.” During their BCcampus conducted a comparative analysis of math-focused open-source homework systems and provided a

³ *Inclusive Access—Deal or Data Mine?* (n.d.). InclusiveAccess.Org. Retrieved August 23, 2022, from <https://www.inclusiveaccess.org/facts/deal-or-data-mine>

report on each. We are especially interested in the research they conducted on WeBWork and IMathAS, and hope to learn from their WeBWork implementation strategy.

VIVA's project is focused on piloting a discipline-agnostic open homework repository that can be used by institutions across the consortium of libraries in Virginia. We will greatly benefit from the insights their project will provide on consortium-level implementation and research on open homework platforms.

We will build upon past projects and then expand research in this area by:

- Exploring of new and emerging open homework systems with the goal of identifying and evaluating as many homework systems as possible, especially systems that are open source and can be combined with OER
- Investigating shared infrastructure for hosted homework systems such as WeBWork
- Finding solutions that work at a larger scale by partnering with trusted 3rd party hosting/support organizations such as Unizin and Pressbooks to pilot LMS-integrated homework solutions
- Building a framework and processes that other libraries in the BTAA and beyond can use for implementing open homework systems
- Partnering with other universities doing similar work, such as VIVA

Project Work Plan

Project Team

“Open Homework Systems: Planning and Piloting Library Support” will be enacted by librarians and staff at Penn State University, the University of Minnesota, and Northwestern University with support from the Big Ten Academic Alliance (BTAA) and Unizin. The project will take place over the course of 2 years, beginning in September 2023 and ending August 2025. There will be three phases to the project including an initial environmental scan and investigation of homework systems, piloting specific OER and homework systems, and disseminating project findings. The core project team comprises:

- Bryan McGeary (PI), Learning Design and Open Education Engagement Librarian, Penn State University
- Micah Gjeltema, Open Education and Affordable Content Librarian, University of Minnesota - Twin Cities
- Lauren McKeen McDonald, Open Education Librarian, Northwestern University
- Shane Nackerud, Director of Libraries Course Materials Services, University of Minnesota - Twin Cities
- Corey Wetherington, Open Education Infrastructure Specialist, Penn State University
- TBD, Graduate student project manager, Penn State University

After an environmental scan of homework systems used by our institutions and an investigation of potential homework systems available the core project team will identify 3-4 instructors at each of our institutions that will partner with us to evaluate both OER and a homework system appropriate for their courses. Instructors will provide feedback through interviews and discussions throughout the semester(s) that OER and homework systems are used in their courses.

Students will participate in the evaluation through enrollment in courses that are using OER and homework systems and by providing feedback through surveys, focus groups, and other mechanisms.

An Advisory Group will also be created to provide guidance and insight. The Advisory Group will be made up of academic librarians who work in different capacities at institutions of various types. The group will receive regular email updates from the core project team and come together periodically to review progress and project results and provide input on dissemination of those results.

Sequence of Activities

Phase I - Environmental scan & investigation of homework systems - Aug 2023 - Dec 2023

Building on the work of the Open Homework Systems Project of the BCcampus and using donated labor from librarians and specialists at participating BTAA institutions, we will perform an environmental scan on our campuses to identify specific departments and courses where purchasing access to an online homework system is required in addition to or as part of a commercial textbook. We expect this investigation to generate a list of proprietary homework systems and identify faculty partners who teach high-enrollment courses within the BTAA that may be interested in replacing their commercial textbook and online homework system with an OER and open homework system supported by the library. At the same time, we will investigate open-source homework systems options available for self-hosting to create a feature matrix for current versions of the software to enable us to understand their functionality and relevance for teaching. Potential homework systems that could be evaluated and piloted include:

- [WeBWork](#)- an open-source online homework system for STEM courses currently used at all three of our institutions
- [IMathAS](#) - a web-based math assessment tool for delivery and automatic grading of math homework and tests.
- [H5P](#) - a plugin for existing publishing systems (such as Canvas and Pressbooks) that enables the system to create over 50 interactive content types like interactive videos, presentations, games, quizzes and more.
- [Pressbooks Results](#) - an extension to Pressbooks that connects H5P activities to the LMS gradebook. This functionality allows the OER and homework system to potentially be combined in the same tool.
- [Doenet](#) - an open-source tool for authoring interactive educational content, measure and share student interactions, and conduct educational research.
- [PrairieLearn](#) - an online problem-driven learning system for creating homework and tests.
- [Carnap](#) - a free and open software framework for teaching and studying formal logic.
- [ChemSketch](#) - free software for drawing chemical structures
- [Artusi](#) - a tool for music educators featuring automatically grading, online interactive workbooks for music theory and aural skills.
- [Runestone Academy](#) - an interactive eBook host that also provides the ability to create and grade assignments and homework (such as through hosting solutions like WeBWork).

The homework system space is continually changing with new systems being developed regularly. Beyond piloting specific systems with partner instructors and courses, our goal is to identify and evaluate as many homework systems as possible, especially systems that are open source and can be combined with OER, and create a homework system matrix and toolkit with recommendations and guidance to librarians and instructors for a variety of disciplines.

Phase II - Pilot - Jan 2024 - May 2025

After identifying proprietary homework systems, open-source homework systems, and possible high-enrollment courses and instructors willing to partner, we will fund the work to pilot the use of OER and open homework systems in nine courses across three institutions within the BTAA, including Northwestern University, Penn State, and the University of Minnesota, with the goal of using these pilots as a way of providing a proof of concept across several disciplines. Training and guidance will also be provided to instructors based on their needs and the complexity of the homework system selected for their course. This is an area where instructor feedback will be very useful: how difficult is it to use a particular homework system, especially if the instructor has never used it before? This feedback will inform our overall recommendations for homework systems at a larger scale.

As the BCcampus has noted, installing and managing servers for open homework systems (e.g., WeBWorK or iMathAS) is a barrier for some institutions to provide these services to faculty themselves. Therefore, we will potentially partner with Unizin, who has expressed great interest in this project and see it as a way to increase the use of OER within their own ecosystem (namely the Engage platform). Unizin is a nonprofit consortium of higher education institutions, including many BTAA institutions, that specializes in enabling higher education institutions to build and use technology solutions. Based on the investigation in Phase I, we expect to identify 2-3 homework systems requested by instructor partners that may need technical infrastructure hosting and support. Unizin has expressed willingness to assist with this need, and to provide security and privacy protections to student participants. Unizin already has significant experience with protecting student data within its ecosystem of tools in use at its member institutions, which include many within the BTAA, such as Penn State and the University of Minnesota. Prior to implementing any homework systems, they will also go through our institutional courseware approval process, which includes a thorough review of concerns such as security, privacy, and accessibility.

We will also consult and collaborate with the Virtual Library of Virginia (VIVA) with the intent of learning from and building upon the review of platforms being conducted as part of their IMLS-funded project on open homework repositories. We believe that by deeply investigating several disciplinary specific homework systems, our findings can inform their efforts to develop a discipline-agnostic homework repository.

During this phase, we will gather feedback from the participating instructors and the students enrolled in their courses about the usefulness of the open resources and homework systems they are using. We will administer surveys during the midterm and end-of-semester periods for courses offered in the Fall 2024 and Spring 2025 terms. Instructors will provide additional informal feedback to the librarians supporting their courses throughout the training and implementation periods as issues or concerns arise. Prior to initiating our study, we proceed through the IRB approval process, though we anticipate that there is a strong likelihood that our study will be classified as exempt research due to the nature of the data we intend to gather.

Phase III – Toolkit Development and Dissemination Jan 2025 - Aug 2025

Project progress, documentation, findings, and conclusions will be disseminated and shared with the academic library and higher education community via publications and presentations at professional conferences. Inclusive, open access options will be prioritized. Targeted conferences include ACRL, CNI, OpenEd, OE Global, EDUCAUSE, BTAA, and the Unizin Summit. Targeted journals include College &

Research Libraries, Journal of Academic Librarianship, portal: Libraries and the Academy, Information Technology and Libraries, and Code4Lib Journal. The Advisory Board will be invited to disseminate work-in-progress and project results broadly via both professional listservs and direct communications. Finally, a toolkit and homework systems matrix will be developed to capture and communicate broadly all project findings and recommendations.

We will produce a report of our findings in the form of an open toolkit for libraries with best practices and implementation guidance for starting and scaling support for open-source homework systems as part of their OER programs. The toolkit will draw upon information gathered during Phases 1 and 2, and it will be reviewed by the Advisory Board for feedback prior to dissemination. The toolkit will consist of website that includes an open homework system matrix, information and reports with our findings, and guidance and frameworks for other institutions. The website and any linked reports, instructions, or supplementary materials will be assigned a Creative Commons license. These materials will also be added to Penn State's Repository of Open and Affordable Materials (ROAM), and we will work with the Advisory Board and Open Education Network (OEN) to promote the toolkit and any related training. Dissemination of project findings and recommendations will continue beyond the grant period. We anticipate applying for future funding, including a National Leadership Grants for Libraries Implementation Grant, to help us further implement our recommendations on a more sustainable level with the goal of expanding access to and usage of the piloted resources throughout the BTAA and beyond on a national scale.

Evaluating Progress

The project will be assessed regularly for effectiveness, efficiency, quality, and timeliness using criteria and data collected from specified sources at predetermined intervals. Effectiveness will be assessed according to the project goals and outcomes. Efficiency will be evaluated by capturing ways in which project processes optimize resources and minimize costs for the libraries in the project team. Feedback on how the project has enabled team members to make better use of existing resources and minimize time, personnel, and financial outlays as well as how those efficiencies enable them to act on data more purposefully, effectively, or quickly will be gathered using surveys at the close of monthly project team meetings. Quality will be judged according to how well the project meets instructor and student needs and expectations. Project internal audiences include the project team, faculty and instructors, students, and the Advisory Board. Externally, the broader audience of academic librarians and instructional designers are significant. For internal audiences, feedback will be elicited using surveys at the close of all meetings (i.e., monthly for the project team, twice a year for Advisory Board members). For external audiences, feedback will be solicited via open surveys after dissemination events (i.e., listserv and email communications to the community, publications and presentations, and the project toolkit). Timeliness will be assessed against the schedule of completion at monthly project meetings; meeting agendas and reports will be compared to the anticipated timeline.

Shortly after the conclusion of Phase II, the project team will make an initial version of the homework systems toolkit available for download and request contact information in order to download it. The graduate student project manager will follow up on each download several weeks later with a survey request using (at a minimum) the survey questions relevant to our project goals. The project team will also track the total number of downloads of the toolkit.

Project Targets

Because of the time it takes academic libraries to allocate resources to new initiatives, and for new research to be published, we do not expect to see a large number of libraries using the toolkit or implementing recommendations resulting from the project within the lifecycle of the two-year award. Targets that indicate a positive trajectory for adoption of recommendations include:

- Evaluations of the OER and homework systems by instructors and faculty in the pilot group of courses. These evaluations will be collected through in person meetings, online interviews, and email-based conversations in addition to a potential survey instrument. The pilot group will consist of courses in the three project institutions selected based on the size of the courses, a variety of homework systems, and the willingness of instructors to pair OER with a homework system.
- Assuming the homework systems toolkit is ready for download long enough before the end of the award cycle, the project team intends to gather feedback, including survey results, from at least half of the institutions that downloaded any portion of the toolkit. We cannot predict a total number of downloads until the toolkit has been developed and passed through at least one level of refinement.
- Members of the project team expect to present aspects of the toolkit and overall project at library and industry conferences such as ACRL, CNI, OpenEd, OE Global, EDUCAUSE, BTAA, and the Unizin Summit.

Diversity Plan

As has already been established, the cost of course materials have increased dramatically over the past several decades. As publishers work to figure out new profit models in a digital age, students have been left with course materials that cost more than ever before, and at the same time, are less accessible in multiple senses of the word. Prior to the introduction of access codes, students used to be able to buy used course materials, use library copies, or share with classmates. Without those options, students must either purchase the required materials or pay the consequences academically. According to the Student PIRG report, prior to the pandemic, 1 in 5 students reported skipping buying access codes to due cost. Since then, that number has only risen.⁴

We see the implementation of open homework systems as a step toward advancing digital inclusion and equity in the classroom, both through the direct cost savings provided to students, and the potential increase in OER adoption that will result. The collaborative approach we're proposing through BTAA institutions will yield opportunities to target courses in a variety of subject areas, and in high-cost, high-enrollment courses, reaching the greatest number of students possible. By offering OER and open homework systems to students, we aim to help lower-income students continue to pursue higher education. This project is guided by the principle of *redistributive justice*⁵ in its aim to allocate resources to students who have less. Furthermore, as faculty participants adapt OER content and redesign their

⁴ Vitez, K., & Nagle, C. (n.d.). *Fixing the Broken Textbook Market: Third Edition*. 4–5.

⁵ Lambert, S. R. (2018). Changing our (Dis)Course: A Distinctive Social Justice Aligned Definition of Open Education. *Journal of Learning for Development*, 5(3). <https://doi.org/10.56059/jl4d.v5i3.290>

courses for the pilot, we will encourage and support them in applying the principles of *recognitive* and *representational justice*⁶ by interrogating these materials to ensure that their content, curriculum, assignments, and class discussions provide and make room for diverse and marginalized perspectives and that they reflect the student populations they serve.

We also see open homework systems as a potential means of accelerating progress in the area of accessibility. Open-source software is by definition freely available for use and revision by anyone, and so there is a natural tendency toward incremental improvement and enhancement of accessibility whenever open platforms are employed. In contrast to commercial software products, open-source development workflows depend upon transparent and barrier-free processes of feedback and revision in collaboration with a diverse user base. In the absence of a profit motive, developers are better positioned to focus resources on the user experience and accommodating the needs of users. In the course of our assessment of open homework systems, accessibility-related feedback from students and instructors will be documented and shared with the appropriate development teams, furthering the process of refinement toward maximal usability. We believe accessibility is an inherent good for all users, not just those with specific disabilities, and our evaluation of these digital systems presents an opportunity to influence their future development.

Project Results

The cost of access to course materials and homework platforms presents a barrier to students; however, in order to shift to OER, many instructors need viable open homework systems. Our project is intended to examine the viability for widespread implementation of open homework systems in disciplines where there is a potential for high impact in terms of numbers of courses and students, and consequently, cost avoidance for those students. Investment in OER can yield a substantial return on investment in both cost avoidance and student success. For example, Penn State estimates that an initial \$700,000 investment in OER from its Provost has resulted in more than \$4.8 million in student cost avoidance since 2018.

Faculty at our institutions have already demonstrated an interest in pursuing the use of open alternatives to commercial homework platforms. For example, at Penn State, a small, informal WeBWork user group has been in existence for several years; however, they have been inhibited by infrastructure issues. We believe that the requested federal investment in this project will lead to a model that can address such existing barriers.

If the project is successful, we believe that hosting and supporting open homework systems could become a new service provided by libraries as part of their OER programs. Our project will provide libraries and library consortia with information about new and emerging open homework systems as well as models for self-hosting and supporting existing homework systems that support interactive exercises and LMS integration. The results could show how library consortia or individual libraries could do this on their own. We believe our project will produce the following outcomes of national impact:

- Discover and prioritize subject areas that would benefit most from having free access to an open homework system.

⁶ Lambert, S. R. (2018). Changing our (Dis)Course: A Distinctive Social Justice Aligned Definition of Open Education. *Journal of Learning for Development*, 5(3). <https://doi.org/10.56059/jl4d.v5i3.290>

- List specific use cases that homework system software needs to support.
- Curate resources and share an implementation strategy for universities to start or scale a hosted open homework systems service.
- Implement best practices for discoverability of open homework systems.
- Document which open homework systems are currently being used within BTAA institutions.
- Provide recommendations on how libraries can support the development of open-source homework system software.
- List open tools or systems that are currently missing from the market for homework systems on campuses.
- Kickstart a new generation of open homework system support within libraries by identifying gaps in existing commercial alternatives, exploring new and emerging options, and providing frameworks for their use.

In order to sustain the benefits of the project beyond the conclusion of the period of performance, we will continue to revise and improve upon the toolkit. To do this, we will continue to solicit feedback from downloaders of the toolkit. We also anticipate that this project will provide proof of concept that will lead to increased use of these homework systems by more faculty at our institutions and expansion throughout the BTAA and the Unizin consortium. We intend to apply for future grants to help fund such expansion, and we also anticipate that the successful outcomes of this project will drive further investment from BTAA and Unizin member institutions. We would also be open to partnering with other institutions who implement the toolkit. Our evaluation efforts will continue with this increased usage, leading to further refinement of the toolkit.

Digital Products Plan

What type of digital products will you create?

The digital product that we expect to produce from this grant is a website resource (known as the “toolkit”). This will include an open homework system matrix, information and reports with our findings, and guidance and frameworks for other institutions. The website and any linked reports, instructions, or supplementary materials will be assigned a Creative Commons license.

OER and content for open homework systems will also be created as part of the work of this grant. That content will be produced by faculty and is outside the scope of this plan.

Availability of digital product(s)

Anyone with an internet connection will be able to access the website without restriction. The website will be openly licensed to allow for copying, adaptation, and redistribution.

Access and limitations

The copyright for the toolkit will be shared by the creators at Penn State University, Northwestern University, and the University of Minnesota. The website resource will be assigned a Creative Commons license to allow others to share and adapt with attribution.

Sustainability

When created, the toolkit will be checked with standard web accessibility checkers. Google Analytics will be used to track usage. The website will remain live until 2028, at which point it will be evaluated for relevance. At that point, and depending on relevance, the toolkit will remain in its form or be archived in the institutional repositories at Penn State University, Northwestern University, and the University of Minnesota.

Organizational Profile

Mission: “The Pennsylvania State University is a multi-campus, land-grant, public research University that educates students from around the world and supports individuals and communities through integrated programs of teaching, research, and service. Our instructional mission includes undergraduate, graduate, professional, continuing, and extension education, offered through both resident instruction and distance learning. Our educational programs are enriched by the talent, knowledge, diversity, creativity, and teaching and research acumen of our faculty, students, and staff. Our discovery-oriented, collaborative, and interdisciplinary research and scholarship promote human and economic development, global understanding, and advancement in professional practice through the expansion of knowledge and its applications in the natural and applied sciences, social and behavioral sciences, engineering, technology, arts and humanities, and myriad professions.”¹

Organization: The Penn State University Libraries is led by the Dean of University Libraries and Scholarly Communications, who reports to the Executive Vice President and Provost. The Provost reports directly to the University President, who in turn reports to the Board of Trustees.

Service Area: As Pennsylvania’s land-grant university, Penn State provide unparalleled access to education and public service to support the citizens of the Commonwealth of Pennsylvania and beyond. The University engages in collaborative activities with private sector, educational, and governmental partners worldwide to generate, integrate, apply, and disseminate knowledge that is valuable to society. With its administrative and research hub at the University Park campus, Penn State has twenty-three additional locations across Pennsylvania. While some of these locations, such as the Penn State Health Milton S. Hershey Medical Center, have specialized academic roles, they all adhere to a common overall mission and set of core values and strategic goals. Penn State has 34,604 employees² and an enrollment of 88,116 students.³

History: Penn State was founded in 1855 as an agricultural college and admitted its first class in 1859. The Pennsylvania legislature designated Penn State as the Commonwealth's sole land-grant institution in 1863, which eventually broadened the University's mission to include teaching, research, and public service in many academic disciplines. Penn State has awarded more than a half-million degrees and has been Pennsylvania's largest source of baccalaureate degrees at least since the 1930s. Today, Penn State is one of four “state-related” universities, institutions that are not state-owned and -operated but that have the character of public universities and receive substantial state appropriations. The University Libraries comprise 36 libraries at 24 locations across Pennsylvania.⁴ The Libraries employ 543 full-time equivalent staff and are ranked ninth in the Association for Research Libraries investment index⁵. Library expenditures totaled \$58,415,794 in FY 2021. More information about the Penn State Libraries’ mission and governance structure can be found at <https://libraries.psu.edu/about/organization-glance>.

¹ <https://provost.psu.edu/mission-vision/>

² <https://datadigest.psu.edu/faculty-and-staff/>

³ <https://datadigest.psu.edu/student-enrollment/>

⁴ <https://libraries.psu.edu/about/general-information/history>

⁵ <https://libraries.psu.edu/about/organization-glance/libraries-statistics-and-data>