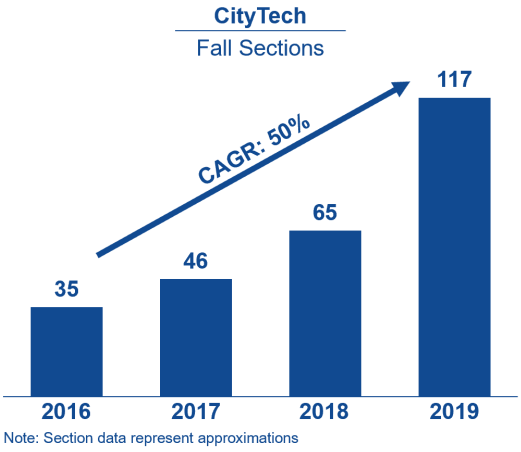
## Building a thriving WeBWorK community at CUNY

In 2012, driven by the desire to provide zero cost alternatives to expensive texts and proprietary homework platforms, City Tech math department faculty began authoring open source textbooks[1] and using WeBWorK to provide online homework for its students. At the time, WeBWorK problems were created by primarily relying on content shared by other WeBWorK-using institutions via the Open Problem Library (OPL). While less than ideal in some ways, this level of WeBWorK adoption represents a minimum amount of required investment - and it is essentially how all WeBWorK-using institutions get their start. Several CUNY campuses are still at this stage - where they have curated their curricula from the contributions of other institutions.

It is common for institutions to see limited adoption of WeBWorK during this phase, and City Tech was no different. Instructors participated in WeBWorK training on a strictly voluntary basis, with no compensation provided for trainers or trainees. Students struggled with inconsistencies between problems - stemming from the fact that the problems themselves came from different institutions or that the problems used terminology aligned to a different book than the one used by their instructor. In short, the curriculum needed revisions in order to be consistent at the problem level, and alignment with the textbook at the course level. without external support, this revision process moved forward at a very slow pace.




In 2015, City Tech was jointly awarded a 5 year, $3.2 million, Title V Department of Education grant with BMCC: Opening Gateways to Completion.[2] This funding was transformational in providing essential resources to faculty who were developing WeBWorK content and disseminating best practices for the use of WeBWorK in the classroom. The pace at which each campus was able to develop and align their curricula began to accelerate.

As early as Fall 2016, content for a full course of College Algebra & Trigonometry had been completed and faculty training began. Several professors were identified as “experienced” WeBWorK users, and they served as early-adopters for the new

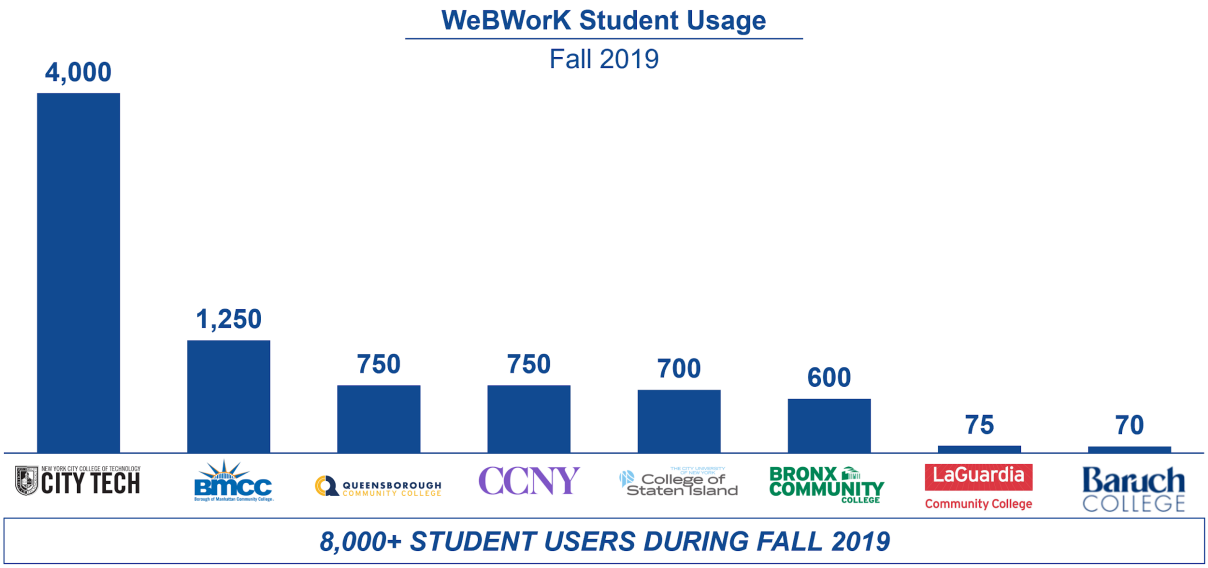
[1] Arithmetic | Algebra by ElHitti, Bonanome, Carley, Tradler and Zhou and Arithmetic | Algebra Homework by ElHitti, Masuda and Zhou; Precalculus by Carley and Tradler.
[2] https://openlab.citytech.cuny.edu/openinggateways/

curriculum. During the limited release, lingering inconsistencies in the problems were identified and resolved, feedback from the early-adopters was incorporated, and the curriculum emerged as a polished product. In the subsequent semesters, over 100 instructors have chosen to use WeBWorK in this course at City Tech.

With the grant funding, City Tech has so far completed customized curricula for three STEM-pipeline courses. These problems have been shared back to the WeBWorK community, where City Tech currently ranks as the 7th most prolific contributor to the OPL. A similar sequence of courses has simultaneously been completed at BMCC, and their eventual contribution to the OPL will raise CUNY's OPL ranking even higher. This collection of locally-developed content has benefited an ever-growing body of students. As of Spring 2019, 8,600 students had used grant-funded WeBWorK content across both institutions, representing a value of approximately $215,000[3]. At City Tech, use of these materials has grown to over 100 sections and 88 participating faculty members for the fall 2019 semester. City Tech expects their impact to stabilize around roughly 9,000 students per academic year, with the majority of those enrolled in truly zero cost courses that pair WeBWorK with OER textbooks.

In Fall 2019, with the end of the Opening Gateways Title V grant looming, City Tech took the initiative to reach out to other WeBWorK-using CUNY campuses. Information was gathered on WeBWorK administration, faculty professional development, student/faculty usage, administrative support, growth and future plans. This information was shared with campus participants and discussed at meetings with representatives from **City Tech, BMCC, BCC, City College, LaGuardia CC, Queensborough CC, Baruch** and **CSI**. It was determined that, rather than moving forward separately, a cross-campus collaborative effort for WeBWorK content creation/alignment should be established along with centralized training and professional development.

[3] Using a cost of $25 per student - representing a direct comparison with Lumen




Note: Student data represents approximations provided by campus representatives

In order to focus these efforts, more detailed information was gathered regarding OER textbooks/WeBWorK problem set pairings. Partners willing to align WeBWorK content to specific OER texts in current use by multiple CUNY campuses were identified. A proposal requesting **CUNY OER (Open Educational Resource) funding** was submitted in December of 2019 in support of this project. Since the proposal was submitted off-cycle, the request was only able to be partially granted. Re-submission in the next academic year was encouraged. These funds are supporting partners from **City College, LaGuardia CC and Queensborough CC** in the authoring, alignment and sharing of WeBWorK content for Calculus I (spring 2020). This content will be aligned with the free online textbook OpenStax Calculus[4] and shared back to the community via WeBWorK's Open Problem Library (OPL).

Moving forward, it is the hope that more campuses will be onboarded as partners, widening the adoption of existing content and accelerating the creation of new content. Our ultimate goal is to build a robust WeBWorK community at CUNY with faculty working collaboratively in support of student learning while reducing financial barriers. The potential impact of a fruitful collaboration between campuses is huge as there are currently 250,000 students in the CUNY system, many of which are enrolled in degree programs with math requirements.

If you would like to learn more about our work, please contact us.

Respectfully,

[4] https://openstax.org/details/books/calculus-volume-1

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