

Attachment C • Supporting evidence on burden

Estimated burden hours for applicants using the REU data system common application

Cecilia Speroni², Brittany Vas, and Maria Bartlett

On November 2, 2018, the Office of Management and Budget (OMB) approved the pilot testing of a new data collection system for the National Science Foundation's (NSF's) Research Experiences for Undergraduates (REU) program (OMB Control No. 3145-0248). The REU data system was designed as a centralized online platform for the following purposes:

- Student applicants to provide information required to participate in the REU program.
- REU Site principal investigators to access applicant information and report admissions and participation status.
- Individuals providing references for a student applicant to upload letters of recommendation.
- NSF staff to access information about applicants, participants, and Sites.

Most of the system's respondent burden in this information collection (about 85 percent) is associated with students completing the common application to the program Sites. In the absence of evidence from the program, the approved burden for the REU pilot was based on the estimate from the information collection for the NSF Graduate Research Fellowship Program (GRFP) (12 hours to complete the full application, OMB Control Number 3145-0023). To inform future information requests and to ensure the reported burden is accurate, we used data from the pilot to estimate the average amount of time applicants spent completing the common application. Specifically, we used system's *paradata*—usage data describing the data collection process—to calculate the time elapsed between an applicant logging into the system and submitting an application to an REU Site.

We found that the average REU applicant in the pilot submitted applications to 2.3 Sites and spent 3.25 hours actively engaged in the system from log-in to submission. If we factor an additional 3.8 hours offline to prepare materials for the application, the total burden estimate is 7 hours—lower than the 12 hours per applicant originally requested and approved by OMB.

Burden estimate

Because paradata track users' activities (such as logging in, logging out, and navigating to another page in the application form), we do not know whether periods of inactivity represent “burden” (for example, the user could have been thinking about how to answer a question in the application or the user could have disengaged with the application and the session ultimately expired). Given this, we estimated burden hours by first calculating the time spent (actively engaged) online and then made assumptions on the time spent offline preparing application materials.

Online time

We found that, on average, applicants spent about 3 hours, 2 minutes to complete the first application submission, which included applying to two REU Sites, on average (Table 1). (This

² Corresponding author (csperoni@mathematica-mpr.com).

translates into a burden of about 1.5 hours per Site application when applying for the first time.) A small share of applicants came back to the system to submit applications to additional Sites after the first submission. These subsequent applications took considerably less time to complete. For example, among those who submitted a second round of applications, applicants spent 42 minutes to complete the submission.

Table 1. Applicant burden in the REU common application system

Application submission session	Applicants (N)	Average elapsed time (hours: minutes: seconds)	Average number of Sites applied to (N)	Average elapsed time per Site application (hours: minutes: seconds)
1	2,892	3:02:16	1.96	1:33:00
2	414	0:42:13	1.3	0:32:28
3	190	0:43:51	1.2	0:36:33
4	94	0:29:23	1.17	0:25:07
5	49	0:34:46	1.1	0:31:36
6	21	0:37:54	1	0:37:54
7	7	0:48:14	1	0:48:14
8	3	0:20:11	1	0:20:11
9	2	0:05:41	1	0:05:41
Average (weighted)^a		2:32:07		1:20:11

Source: 2020 REU data system.

Notes: Table is based on the 2,892 students who have applied to a 2020 REU Site through the REU data system as of May 21, 2020 (a total of 6,286 applications). A total of 125 students were excluded from the analysis of time elapsed due to missing data from the Site application timestamps. This issue stems from updates to the database that were made manually to accommodate help desk requests to (1) retract application submissions for students who wanted to update their application materials and (2) enter award numbers after Sites began collecting applications (for Sites that recruited while awaiting award funding from NSF).

Table reads: A total of 2,892 applicants submitted an average of two Site applications in one application session and took, on average, 3 hours, 2 minutes to complete the submission. This translates into an average time per Site application of 1 hour, 33 minutes. A total of 414 applicants submitted their applications in two application sessions. In the second session, applicants submitted about 1 Site application, on average, and spent 42 minutes to complete the submission.

^aAverage weighted by the share of applicants in the application submission session.

Offline time

Burden estimates reported in Table 1 include time that applicants spent reviewing instructions, completing and reviewing their responses, and transmitting their application. It does not necessarily include time applicants might have spent offline preparing for the application. As part of their common application, students must upload a curriculum vitae and an unofficial college transcript, and type a short personal essay. In addition, students must respond to any Site-specific questions Sites might have added to the common application.

To estimate time spent offline preparing application materials, we analyzed the length of applicants' essays. We found that applicants typed, on average, a total of 4,585 characters (2,934 characters in

their personal statement and 1,651 characters in their responses to the Site-specific questions; Table 2). This amounts to approximately 680 to 700 words. Adults typically type at about 40 words per minute (wpm) when writing for leisure and 5 wpm for in-depth essays or articles.³ At the rate of 5 wpm, we estimate applicants spent 2 hours, 20 minutes to draft their responses in the REU application (700 words divided by 5 wpm is 140 minutes).

Table 2. Length of applicants' responses to the personal statement and Sites' questions (number of characters)

	Personal statement	Site-specific questions			
		Question 1	Question 2	Question 3	All questions
Average	2,934	561	727	363	1,651
Median	2,955	145	314	94	1,143
Minimum	27	0	0	0	0
Maximum	5,000	5,000	5,000	4,998	14,277
Number of applicants	2,891	2,890	2,891	2,890	2,891
Number of applications	2,891	6,776	6,774	6,772	6,778

Source: 2020 REU data system.

Notes: Table is based on the 2,892 students who have applied to a 2020 REU Site through the REU data system as of May 21, 2020. However, one applicant who withdrew the application left responses missing. The personal statement is a required component of the common application. Sites can add Site-specific questions to the common application. Because not all Sites required additional questions, the minimum number of characters for responses to each of these questions is 0. The system imposes a limit of 5,000 characters to all responses. Spaces and punctuation count as characters.

Table reads: Applicants typed, on average, 2,934 characters in their personal statement and 1,651 characters in their responses to the Site-specific questions.

³ <https://capitalizemytitle.com/writing-time/>

In addition to the time spent drafting the personal statement and Site-specific questions, applicants spend time offline preparing a resume and obtaining an unofficial college transcript. We assume applicants would need an additional 1 hour, 30 minutes (offline) to fulfill these requirements. Most applicants are expected to have a resume they can use with minor updates (because resumes are often encouraged, if not required, for college admissions) and colleges facilitate transcript requests, often enabling students to download unofficial copies directly from the registrar’s online system.

Total time

For the average REU applicant in the pilot, the estimated burden is about 7 hours (3.25 hours online and 3.8 hours offline), lower than the 12 hours approved by OMB. The respondent burden to complete an application through the REU data system depends on the number of REU Sites the student is applying to. Because REU system users can submit multiple Site applications through the common application, and Sites can request up to three additional Site-specific questions, the more Sites the student applies to, the higher the burden the respondent incurs. The average applicant in the REU pilot submitted 2.3 Site applications through the system (not shown). Applicants who submit applications to more than two Sites generally do it in two application sessions (as indicated in Table 1). The average applicant would then submit two Site applications in one application session, and 0.3 of an application in a subsequent session. Therefore, for this average applicant, the estimated time to fill out the application online was 3 hours, 15 minutes (Table 3).

In addition, we estimated applicants spend about 2 hours, 20 minutes (offline) drafting the personal statement and Site-specific questions. If we assume an additional 1 hour, 30 minutes (offline) to prepare a resume and get an unofficial copy of their college transcript, the total burden estimate is 7 hours, 5 minutes (Table 3). This incurred burden is lower than the approved 12 burden hours for the REU pilot, which were originally estimated based on the GRFP information collection.

Table 3. Estimated applicant burden for the average REU applicant

	REU common application system (hours: minutes: seconds)
Online time	3:15:44
Offline time	
Personal statement and Site-specific questions	2:20:00
Other materials (resume and unofficial transcripts)	1:30:00
Average applicant burden (total)	7:05:44

Source: 2020 REU data system.

Note: The average REU applicant submitted 2.3 Site applications. Online time for the average REU applicant in the pilot is calculated using estimates from Table 1 as follows: 2 applications multiplied by time elapsed per application in first submission session, plus 0.3 applications multiplied by time elapsed per application in the second submission session. Offline time to draft the personal statement and Site-specific questions assumes applicants write at the rate of 5 words per minute.

Methodological appendix

The REU data system's paradata record timestamps for when users complete each of the following activities:

1. Logging in and logging out
2. Saving a page
3. Navigating to a different page
4. Submitting an application

We extracted the system activity data for each user with at least one application submission for the 2020 REU program and arranged the activity records in chronological order. To calculate an individual user's elapsed time, we subtracted the difference between the user's system activity timestamps and valid log-in sessions, then summed the resulting differences. A log-in session was considered valid until the user actively logged out or submitted the application, or until the last recorded activity if the session expired due to inactivity. Log-in errors that occurred before users successfully logged into the system, if present, were not included in the analysis.

Table A.1 illustrates the system's usage data for an applicant and provides an example of how we calculated the online time the applicant spent completing the common application.

Table A.1. Example of system's usage data for an applicant using the REU common application

User number	Date and time	Activity	Page visited	Running elapsed time
100020473	2020-01-25 22:57:52	Log-in		0:00:00
100020473	2020-01-25 22:59:12		Personal Info page	0:01:20
100020473	2020-01-25 22:59:42		Demographic Info page	0:01:50
100020473	2020-01-25 23:01:11		Current Enrollment page	0:03:19
100020473	2020-01-25 23:01:54		Additional Info page	0:04:02
100020473	2020-02-15 01:01:54	Session expired		
100020473	2020-02-15 04:12:11	Log-in		0:04:02
100020473	2020-02-15 04:12:19		Letter of Recommendation page	0:04:10
100020473	2020-02-15 04:12:24			0:04:15
100020473	2020-02-15 04:12:24	Application submitted		0:04:15
Total elapsed time				0:04:15

Source: REU data system, 2019–2020 REU application cycle.

Note: Table shows an example of usage data for an applicant who completed the common application over two days. This applicant never logged out from the system but had one session expire after two hours of inactivity.

Total elapsed time indicates the time online for which the user was known to be actively engaged with the website, excluding periods of no recorded system activity until the system automatically logged the user out.