REQUEST FOR APPROVAL under the Generic Clearance for NASA Education Performance Measurement and Evaluation, OMB Control Number 2700-0159, expiration 04/20/2018

I. TITLE OF INFORMATION COLLECTION: NASA Office of Education Undergraduate Internship Impact Surveys-Follow-up Instruments I

II. TYPE OF COLLECTION:

- ☐ Focus Group Protocol
- ☐ Usability Protocol
- ☐ Cognitive Interview Protocol
- ☑ Attitude & Behavior Scale
- ☐ Satisfaction Survey
- ☐ Baseline Survey
- ☑ Follow-up Survey

III. GENERAL OVERVIEW: The NASA Internship, Fellowship, and Scholarship (NIFS) line of business (LOB) leverages NASA's unique missions and programs to enhance and increase the capability, diversity, and size of NASA's and the Nation's future STEM workforce. In so doing, NASA Education manages its undergraduate internships through the NIFS LOB. NASA Internships are defined as competitive awards to support educational work opportunities that provide unique NASA-related experiences for educators and high school, undergraduate, and graduate students. Note, however, that the focus of this information collection is undergraduate internships. These internships engage students with real-world experiences while contributing to the operation of a NASA facility or the advancement of NASA's missions. The internship process is supported by the One Stop Shopping Initiative (OSSI), which provides a NASA-wide integrated application, selection, and data collection/reporting system that is centrally located at https://intern.nasa.gov.

III. INTRODUCTION AND PURPOSE: Internships are distinguished from other experiential learning opportunities by a focus on mentor-directed, degree-related, work-place task completion within an authentic learning environment (Linn, 2004; Herrington & Herrington, 2005). Our interest is in understanding why, how, and in what ways students are impacted in the short-, intermediate, and long-term by participation in NIFS internship experiences. Thus, the purpose for pilot testing is to develop valid instruments that reliably explain the ways in which participants' attitudes and behaviors are impacted by the experiential learning opportunity of the internship. Guided by the most current STEM education, research, and measurement methodologies, it is the goal of this rigorous instrument development and testing procedure to provide information that becomes part of the iterative assessment and feedback process for this line of business. This information collection includes instruments designed to assess intended outcomes associated with participation in a NASA internship experience. Of the myriad undergraduate STEM-related educational outcomes of interest to NASA Education (Crede & Borrego, 2013; Duckworth, Peterson, Matthews, & Kelly, 2007), this first pilot cycle includes two descriptive surveys to collect predictor variable data and two surveys to assess psycho-social factors hypothesized in the research literature as relevant to success in STEM disciplines (Xie, Fang, & Shauman, 2015). General descriptions of the instruments are as follows:

- General expectations for the NASA internship experience
- Preparedness to undertake research in a laboratory and/or field setting (e.g., Gilmore, Vieyra, Timmerman, Feldon, & Maher, 2015)
- Development related to students' intention to complete their degrees and satisfaction with their programs (Crede & Borrego, 2013)
- Grit or perseverance towards achieving long-term goals (Duckworth, Peterson, Matthews, & Kelly, 2007)

Hence, the goals of this cycle of pilot testing are as follows:

- Determine preliminary psychometric properties (e.g., validity, reliability) of the instruments, to explore individual item functioning, and to make any necessary adjustments in preparation for large-scale testing as the basis for more sophisticated statistical testing.
- Determine which of two testing designs-- traditional pre-test-post-test or the retrospective pre-test method-- obtains the most accurate responses with the highest response rate while minimizing burden on respondents.
- Determine an accurate response burden for these instruments.

IV. RESEARCH DESIGN OVERVIEW: NASA Education is using a one-group pretest-posttest quasi-experimental design, with the addition of a retrospective pretest for one attitude and behavior survey to test the possibility of reducing burden imposed upon the public. Because NASA Education anticipates frequent use of attitude and behavior, and knowledge surveys, the phenomenon of response shift bias is of particular concern. For this reason, one retrospective survey has been inserted into this pilot testing rotation. Despite the absence of a control group, this design can still yield strong causal effects when effort is made to satisfy requirements of quasi-experimentation such as identifying and reducing the plausibility of alternative explanations for the internship-as- treatment effect (Shadish, Cook, & Campbell, 2002), identifying conceivable threats to internal validity, and statistically probing likelihood of treatment-outcome covariation (Mark & Reichardt, 2009).

Empirical research (e.g., Howard, 1980; Drennan & Hyde, 2008; Nimon, 2014) suggests that a retrospective pretest (then-test) may provide a more accurate pre-intervention measure than a traditional pretest if it happens that respondents change their perceptions of their initial level of functioning as a consequence of the intervention. In other words, respondents change their internal standards of measurement having gained in experience or familiarity with the self-rating dimension(s) (Nimon, 2014). According to Norman (2003), "[r]esponse shift theory presumes that [participants'] prior state is adjusted in retrospective judgment on the basis of new information acquired in the interim, so that the retrospective judgment is more valid" (p. 243). The statistical manifestation of rating oneself on a different dimension or metric at post-test results in a mismatch between pre- and post-test scores known as response shift bias (Goedhart & Hoogstraten, 1992). The retrospective pretest is considered to be a valid assessment tool when respondents cannot be expected to know what they do not know at the onset of an intervention (Pelfrey and Pelfrey, 2009). Such may be the case with respondents who are participating in a NASA opportunity and/or are completing an attitude and behavior or knowledge survey for the very first time. Response shift bias is identified through administration of a traditional pretest, posttest, and then-test wherein some respondents are administered the traditional pretest and posttest set and other respondents are administered the then-test.

Following this pilot phase of testing and subsequent determination of instrument psychometric properties, indeed NASA Education has tentative research questions and hypotheses to test regarding the impact of internship experiences on NASA internship awardees. Thus, this work is integral to the iterative assessment and feedback process for the NASA Internships, Fellowships, and Scholarships line of business

V. TIMELINE: Testing of surveys will take place approximately January 18, 2016 through August 1, 2016. These dates coincide with the 2016 Spring and Summer internship sessions. Trends for internship data between 2011 and 2015 show a 20% annual increasing trend in internship placements and an average of 1,074 internship placements across spring and summer sessions for those years. In that light, we are confident that within this time frame we will acquire the statistically relevant number of responses to the pilot test pre- and post-internship surveys by using particular strategies for increasing response rates to counter historically low response rates and challenges presented by attrition (Barclay, Todd, Finlay, Grande, & Wyatt, 2002).

VI. SAMPLING STRATEGY: NASA Education employed an estimation procedure to determine the statistically adjusted number of respondents for the final sample size that meets the minimum criteria for number of respondents ($N \geq 200$) necessary to determining preliminary item characteristics (Komrey & Bacon, 1992;

Reckase, 2000). This estimation procedure accounts for the potential respondent universe, estimated variance in respondent universe, precision desired, confidence level, and the prior observed response rate for the category of respondents (Watson, 2001). Watson's sample size formula as applied to Spring and Summer 2015 data in Table 1 demonstrates the number of respondents this pilot effort should reach in order to collect the base sample size of respondents (2001). In brief, this formula suggests that this pilot effort oversample by 200 respondents. NASA Education will randomly sample from the OSSI data base of internship placements at the conclusion of the selection process, which is completed by December 31, 2015.

Table 1. *Calculation chart to determine statistically relevant number of respondents*

Data Collection Source	(N) Population Estimate for FY 2015 Q4	(A) Sampling Error +/- 5% (.05)	(Z) Confidence level 95%/ Alpha 0.05	(P) *Variability (based on consistency of intervention administration) 50%	Base sample size	Response Rate	(n) Number of Respondents
OSSI Internship Placements	1,379.00	0.0025	3.84	0.50	300	0.60	500

VII. BURDEN HOURS: Burden calculation is based on a respondent pool of individuals that complete a set of instruments after completion of an internship (Table 2) as follows:

Table 2. *Follow-up Instruments*

Respondent Category	Statistically Adjusted Number of Respondents	Frequency of Response	Total minutes per Response	Total Response Burden in Hours
Internship Expectations Post-Survey	500	1	4	33
Research Preparation Post-Survey	500	1	4	33
Grit Outcome Survey	500	1	4	33
Total				**99**

VIII. DATA CONFIDENTIALITY MEASURES: Any information collected under the purview of this clearance will be maintained in accordance with the Privacy Act of 1974, the e-Government act of 2002, the Federal Records Act, and as applicable, the Freedom of Information Act in order to protect respondents' privacy and the confidentiality of the data collected.

IX. PERSONALLY IDENTIFIABLE INFORMATION:

1. Is personally identifiable information (PII) collected? ☑Yes ☐ No

2. If yes, will any information that is collected by included in records that are subject to the Privacy Act of 1974? ☑Yes ☐ No

3. If yes, has an up-to-date System of Records Notice (SORN) been published?
☑Yes ☐ No
Published in October 2007, the Applicable System of Records Notice is NASA 10EDUA, NASA Education Program Evaluation System - http://www.nasa.gov/privacy/nasa_sorn_10EDUA.html.

APPLICABLE RECORDS: Completed surveys will be retained in accordance with NASA Records Retention Schedule 1, Item 68D. Records will be destroyed or deleted when ten years old, or no longer needed, whichever is longer.

X. PARTICIPANT SELECTION APPROACH:

Does NASA Education have a respondent sampling plan? ☑Yes ☐ No

If yes, please define the universe of potential respondents. If a sampling plan exists, please describe? The universe of potential respondents includes undergraduate students participating in a NASA internship.

If no, how will NASA Education identify the potential group of respondents and how will they be selected? Not applicable.

XI. INSTRUMENT ADMINISTRATION STRATEGY

Describe the type of Consent: ☐ Active ☑ Passive

4. How will the information be collected:

- ☑ Web-based or other forms of Social Media (Survey Monkey)
- ☐ Telephone
- ☐ In-person
- ☐ Mail
- ☐ Other

5. Will interviewers or facilitators be used? ☐ Yes ☑ No

XII. DOCUMENTS/INSTRUMENTS ACCOMPANYING THIS REQUEST:

- ☐ Consent form
- ☑ Instrument (attitude & behavior scales, and surveys)
- ☐ Protocol script (Specify type_____)
- ☐ Instructions
- ☐ Other (Specify _____)

XIII. GIFTS OR PAYMENT: ☐ Yes ☑ No

XIV. ANNUAL FEDERAL COST: The estimated annual cost to the Federal government is $380. The cost is based on an annualized effort of 11.5 person-hours at the evaluator's rate of $33/hour for administering the survey instruments, collecting and analyzing responses, and editing the survey instruments for ultimate approval through the methodological testing generic clearance with OMB Control Number 2700-0159, exp. 04/30/2018.

XV. CERTIFICATION STATEMENT:

I certify the following to be true:

1. The collection is voluntary.
2. The collection is low burden for respondents and low cost for the Federal Government.
3. The collection is non-controversial and does raise issues of concern to other federal agencies.
4. The results will be made available to other federal agencies upon request, while maintaining confidentiality of the respondents.
5. The collection is targeted to the solicitation of information from respondents who have experience with the program or may have experience with the program in the future.

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[1] All works cited are available to share via PDF upon request. Please request directly from lisa.e.wills@nasa.gov.

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