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Intuitive System Training

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NPS NRP Executive Summary

Title: Intuitive System Training

Report Date: 10/14/19 Project Number (IREF ID): NPS-19-N212-A

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NAVAL RESEARCH PROGRAM
NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

INTUITIVE SYSTEM TRAINING

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Researchers:

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EXECUTIVE SUMMARY

Project Summary

The schools under the Naval Education and Training Command (NETC)'s cognizance are committed to producing the best possible Sailors for the fleet. To this end, it is important for NETC to collect accurate information regarding how well the training and education Sailors receive at various schools apply to their current job duties. The current method for collecting this information is through assessment surveys that NETC disseminates to all graduates of the many schools it oversees and their supervisors at their first duty station. The staff at NETC worries that this method potentially faces sampling challenges and measurement errors due in part to Department of the Navy (DoN) policies and regulations. These sampling challenges and measurement errors can then lead to inaccurate results and low confidence in those results, which is especially important now because NETC is leading the Navy's transition to Ready, Relevant Learning (RRL). The shift to RRL will require NETC to make significant changes to current training practices, and NETC needs reliable data during this change—otherwise, the organization might not recognize significant training lapses or could make decisions based upon flawed data.

To examine these challenges, we reviewed the literature on survey design and management. From this literature review, we created a summary of best practices in survey design and management and investigated whether NETC's current practices are producing results which it can use to correctly assess the performance of its schools.

Keywords: *Surveys, training effectiveness, Naval Education and Training Command, NETC, Job/duty task analysis, JDTA, Ready Relevant Learning, RRL*

Background

Current methods to create the surveys sent to graduates and their supervisors are based upon the job/duty task analysis (JDTA) for each rating that NETC educates in either an "A" or a "C" school. From this JDTA, NETC personnel work with subject matter experts to create a subset of approximately 20–30 tasks pertinent to that rate and ask three questions about each task: how frequently the Sailor performs it (rated on a "Daily," "Weekly," "Monthly," etc. scale), how proficient the Sailor is at it (rated from "Needing training" to "Able to train others"), and how adequate the Sailor believes the training to be (rated from "Highly adequate" to "Not at all adequate").

Current response rates to these surveys are fairly low, on the order of 20% return by the graduates and 10% for their supervisors. NETC desires to know whether the low response rate means that the data derived from these surveys is inadequate: As RRL is phased in across the Fleet, NETC must have a method of determining whether this new training paradigm is producing Sailors at the same or higher levels than previous training methods. Thus, NETC needs to know whether current survey methodology is sufficient; if not, it must attempt to find methods to overcome the causes of the low response rates. These low response rates are due to several difficulties in administering the surveys:

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- The surveys are sent directly to the Sailors. NETC does not know (and it is not practical to obtain) the identity of the graduates' direct supervisors; it therefore sends the surveys to the graduates' commands and trusts that the chain of command will direct them to the correct individuals. Thus, for the surveys to reach the proper supervisor, several events need to occur correctly but often do not. Most recently, the NETC command career counselor has begun sending the surveys to the command master chiefs and command career counselors of the ships in the hopes that this will result in a large portion of the supervisors' surveys being returned, but this change is too new to determine its efficiency.
- NETC wants graduates to take the survey after they have been in their jobs for at least three months, and it is precluded from surveying graduates more than twelve months after their graduation. Considering that most Sailors take a month to reach their next duty station, often spending three months in non-rate duties (e.g., working on mess decks), this leaves a small window to reach the graduates and their supervisors and have them take the surveys.
- The Office of General Counsel has ruled that the Sailors and their supervisors cannot be forced to complete these surveys. This ruling is despite the fact that reviewing the performance of Sailors serving under them is the responsibility of every Sailor in the Fleet.

Much is known about best practices in survey design and implementation (Bethlehem & Biffignandi, 2012), and some work has been done that specifically addresses surveys for military populations (Buttrey et al., 2011; O'Connor et al., 2011). In this research, we developed guidance regarding sampling procedures, survey design and implementation, and data processing that can be used to refine NETC's current method, with the goal of obtaining greater confidence in the assessment survey results. We also indicate areas in which DoN policies and regulations are impeding NETC's ability to collect accurate information on these assessments from a representative sample.

Findings and Conclusions

To investigate this issue, we conducted a literature review of the research regarding survey responses and design. We focused on topics directly related to the NETC's goals of attaining accurate survey assessment results from a representative sample of graduates and supervisors: sampling design, survey design, and data processing. We published a technical report with our complete findings and recommendations (Kennedy & McDowell, 2019); the highlights are presented below.

A. ATTAINING A REPRESENTATIVE SAMPLE

It is important that the sample of survey participants is representative of the population of interest; in the case of NETC, the populations of interest are (1) all graduates from NETC in the past several months and (2) all personnel who are currently the direct supervisors of these graduates. Both sampling design and response rates can impact the extent to which a representative sample is attained.

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B. ATTAINING ACCURATE DATA

Attaining accurate data requires not only a representative sample, as discussed above, but also the reduction of measurement error. Bethlehem & Biffignandi (2012) outline the types of errors that can lead to inaccurate survey results, including sampling error, overcoverage error, undercoverage error, nonresponse errors, and two common forms of measurement and processing errors—memory errors and satisficing. Satisficing is filling out the survey as quickly as possible without giving much consideration to the questions; it often manifests itself as the respondent filling in either all the lowest or highest responses.

C. DATA PROCESSING

Data processing is essential for ascertaining whether a representative sample and accurate data were obtained. Data processing entails collecting and analyzing paradata—data that is generated while participants complete the survey. Examples of paradata include the time taken to answer each question, which keys are pressed, and whether or not participants used any help functions. Paradata can either be maintained on the server (server-side) or on the client's machine (client-side).

Recommendations

We recommend that NETC make the following modifications to its survey procedures in order to improve the three areas we covered in our findings:

A. SAMPLING PROCESSES

- Goal: To increase the number of people in the population of interest who receive the survey request; to reduce potential undercoverage or overcoverage.
- Comments: Due to the NETC's current method for disseminating the survey to the supervisors, the supervisor who receives the survey may not be the direct/correct supervisor for the targeted graduate. However, NETC cannot ascertain how often the wrong supervisor completes the survey. This issue leads to concerns of potential undercoverage of direct supervisors and overcoverage of non-direct supervisors.
- Recommendations: In the email that is sent directly to the graduate, provide two links: one that the graduate uses to complete the survey and one that they send to their supervisor. This way, NETC will have confidence that the survey was sent to the correct supervisor.

B. RESPONSE RATE

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- Goal: To ensure an appropriate response rate is achieved for both the graduate and supervisor surveys.
- Comments: Adequacy of the response rate is tied to sample representativeness. A 10% response rate may be sufficient if the sample is representative. Making completion of the survey mandatory can be problematic both in terms of DoD policies and instructions and in terms of increasing the likelihood of satisficing.
- Recommendations:
 - Ask CRESST to provide descriptive statistics on survey demographic information to ascertain if the sample of responders is representative of the population of interest. If the sample is representative, then the low response rate is of less concern.
 - Per results from Newell, Rosenfeld, and Harris (2004), offering an incentive, such as recommendation for a liberty card to those graduates and supervisors who complete the survey, may increase response rates.
 - Per results from Newell et al. (2004), providing a summary of the survey results and any changes to trainings based on the survey results to the survey respondents may, in the long term, increase response rates. This information also can be used in the survey request to future cohorts of graduates and supervisors as a way to demonstrate that NETC takes their opinions seriously.

C. SURVEY DESIGN

- Goal: to increase accuracy of responses and reduce measurement errors.
- Comments:
 - The majority of the survey design follows best practices: the survey follows a logical order, only one question is shown at a time on the web version, and the response options for the frequency and proficiency questions are clear and logically spaced.
 - However, some wording is a little confusing. For example, in the adequacy and quality question, no distinction between “adequacy” and “quality” is provided. The definition for the “Excellent” response option is unusual and may confuse participants. Finally, verb tenses are sometimes inconsistent within a given question.
 - Additionally, due to the timing of when the survey can be distributed, respondents might not accurately remember the information solicited by questions dealing with both the

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frequency and the adequacy/quality of training. However, this issue appears to be inherent in survey administration limitations that are outside of NETC's control.

- The appendix in Kennedy and McDowell (2019) provides specific comments on a supervisor survey. Many of these comments also apply to the graduate surveys.
- Recommendations that apply to both graduate and supervisor surveys:
 - On the adequacy/quality of training questions, remove the word “adequacy” and clarify the definition for the “Excellent” response option, perhaps replacing it with “training enabled me to perform all parts of the skill competently.”
 - On the web version of the survey, provide a link next to each response option or to the center-right of all response options that, when clicked on, provides the definition for each response option.
 - On the general questions about your/your subordinate's performance, use the same verb tense used in the question for all response options.
 - To reduce potential memory effects, start the frequency questions with the sentence, “Think back on your time in this job.”
 - To reduce potential memory effects for adequacy/quality of training questions, start these questions with the sentence, “Think back during your time in <NAME OF SCHOOL OR TRAINING>.”

D. DATA PROCESSING

- Goals: To be able to ascertain sample representativeness and the extent to which satisficing occurs and to reduce item nonresponse rates.
- Comments: Data processing has not yet been completed. Results from data processing will enable NETC to determine whether survey results come from a sample that is representative of the population of graduates/supervisors. Data processing results will also indicate if satisficing and/or item nonresponse occurs and on which questions.
- Recommendations: Ask CRESST to do the following (note: some recommendations are repeated from above):
 - Descriptive statistics on demographics to ascertain if sample of responders is representative of the population of interest. If the sample is representative, then the low

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response rate is of less concern.

- Checks for satisficing.
- For surveys completed on the web, analyze paradata for survey completion times, time to complete each question, and item response rates
- Analyze supervisor responses to see if proficiency responses correspond with quality-of-training questions. If they do correlate, it would indicate that supervisors are using the proficiency rating to respond to the training question. In this case, the training questions could be removed or changed. For example, ascertaining the extent to which supervisors had to train up the subordinate on that task would inform NETC as to whether the subordinate's level of proficiency is due to NETC training or due to the supervisor's training.

The final technical report provided to the sponsor (Kennedy & McDowell, 2019) also contains web survey design recommendations, definitions of common survey terms, and a previously used survey with comments based upon this research.

Recommendations for Further Research

Reevaluate the response rate at a suitable interval after making the changes recommended in this report.

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Acronyms

Department of the Navy	DoN
Job/duty task analysis	JDTA
Naval Education and Training Command	NETC
Ready, Relevant, Learning	RRL