Ranking Detailed Work Activities (DWAs) Within O*NET® Occupational Profiles

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Introduction

This paper describes the procedure used to rank order detailed work activities (DWAs) for each O*NET-SOC occupation. The primary ranking variable used, called *Top Importance,* is a measure of task importance for the tasks that are linked, within each occupation, to each DWA. The DWA rank order presented for each occupation is hierarchical, and each rank number is unique. Because task ratings, which are derived from incumbent and Occupational Expert (OE) data, can be numerically identical, it was necessary to devise a way to break DWA ranking ties. The following is a description of the ranking procedures considered, along with a description of the procedures selected for use in breaking ties.

DWA Background

The National Center for O*NET Development created a new taxonomy of detailed work activities (DWAs) to replace the existing DWA data. The goal was to integrate DWA data within the larger framework of the job-oriented descriptors, such as tasks and generalized work activities, of the O*NET Content Model. (See the technical report of the Work Activities Project).

A detailed work activity is "an intermediate descriptor that allows cross-occupational matching while preserving differentiation, providing a common language for work description, and is easy to understand" (Updating the Detailed Work Activities, National Center for O*NET Development, 2003, p. 3). DWAs were developed through qualitative analysis and rational clustering of O*NET task statements so that a single, general DWA would represent the common activity theme found in a group of similar tasks. DWAs are therefore linked to tasks that are numerically related and hierarchically ranked. By using this task information to rank order DWAs within each occupation, the DWAs can be more meaningfully presented to users of O*NET products and tools. Presenting DWAS in this manner maximizes data usage opportunities.

Ranked DWAs and the tasks corresponding to them, are now available in the occupational reports and cross occupational search features in O*NET Online. (www.onetonline.org)

Evaluation of Ranking Method Options

Although DWAs do not have any numerical data attached to them, the tasks used to build them do have corresponding importance, relevance, and frequency data. The National Center for O*NET Development investigated the possibility of using one or more of these variables to develop a numerical importance ranking for each DWA in a given occupation. These rankings are occupation-specific, and while DWAs cross occupations, the DWA rankings are unique for each O*NET-SOC occupation.
The first decisions to be made involved which task data would be used to derive DWA

ranking scores. Task importance, relevance, and frequency were all options that were considered. Ultimately, task importance was chosen based on effectiveness and usefulness. In addition, it is a concept/methodology that can be easily understood by O*NET users and importance is a variable that is commonly used elsewhere in the O*NET data.

The next choice was to decide how to use task importance in the ranking process so that DWAs would be ranked in a meaningful, valid, and logical manner. Three methods were explored.

One method considered was *Mean Importance*, a basic average of importance ratings of all tasks linked to a DWA, *within a given occupation*. While DWAs cross occupations, each occupation has a unique set of linked DWAs. This linked set of DWAs has a unique set of linked occupational specific tasks. As such, *Mean Importance* was calculated just for those tasks linked to a DWA for a specific occupation.

The second option examined involved the number of tasks that link to a DWA in a given occupation. DWAs typically link to multiple tasks and multiple occupations. But DWAs usually are linked to few tasks within a specific occupation. In fact, 82% of DWAs link to just one task in a given occupation. There remained the question of how to deal with multi-task DWAs because they generally communicate more information about the DWA than single-task DWAs. To address this issue, a method that weighted mean task importance ratings was investigated. A *Weighted Mean Importance* score was calculated for each DWA by multiplying mean task importance for any multi-task DWA by a factor of two. This meant that multi-task DWAs were given twice the weight of single-task DWAs. One issue was that the only consideration in the weighting of multi-task DWAs was that there are more tasks; there was no consideration of the quality or type of the tasks linked to these DWAs.

To better reflect task numbers and the quality of the linked tasks, a third approach was devised. The final approach is called *Top Importance.* To derive this variable, the DWA that includes the task with the highest importance ranking for a given occupation is given the highest score. Since the majority of DWAs in a given occupation link to only a single task, in most cases, this DWA importance score ranks the DWA in the same position that its task is ranked. In other words, with a single linkage, the DWA containing the task ranked first in importance by job incumbents and OEs will be the most important DWA, the one with the task ranked second in importance will rank second, and so on.

Top importance was selected as the method of ranking DWAs because it is an easily performed process that allowed for consideration of multiple-task DWAs. Further, it does not artificially inflate or deflate rank positions as other potential methods did.

Final Ranking Process

Once Top importance was selected as the primary ranking variable, it was necessary to discuss ways to rank order DWAs that had identical rating scores because they were linked to identically rated tasks.

The first consideration in ranking DWAs is the order of the tasks linked to them. A sort that matches DWAs and tasks produces a list of all DWAs linked to the highest rated task or tasks, followed by a list of those linked to the second highest rated task or tasks, etc. In cases where there are no ties in any of the links, the resulting order is based on the DWAs Top Importance score.

However, when ties occur because of issues with tasks that are identical semantically or numerically, then task types (core vs. supplemental) and total task counts (since some DWAs have more than one task linked to them in a specific occupation) are taken into consideration. If these two factors do not produce differentiation between the DWAs in question, the final presentation simply involves presenting the tied DWAs alphabetically.

Thus the DWA data presented in O*NET OnLine are ordered hierarchically, based on the rankings, types, and number of the tasks in the occupation linked to the DWA. Alphabetization is used to make rank order decisions if consideration of the other factors does not provide unique rankings for all DWAs for a given occupation. The data now available online allow users to pull up a list of the any occupation's DWAs, listed in order of importance, along with the specific tasks from the occupation linked to that particular DWA.

Step by Step DWA ranking process

DWAs are ranked separately for each occupation in the O*NET database. For each occupation, the following steps are taken:

1) Collect all tasks associated with the occupation
2) Collect all DWAs linked to one or more tasks from step 1
3) Sort the DWAs from step 2 based on:
    a. The highest importance of any linked task from step 1. (The task's Top Importance score.)
    b. The number of linked tasks from step 1 (DWAs with the highest task count sort first.)
    c. The task type of the highest importance task from step 3a, with DWAs linked to Core tasks sorted to the top of the list
    d. The title of the DWA, sorted in alphabetical order.

If there are no ties in the initial set of DWAs, those DWAs are simply listed in order of the task to which they are linked.