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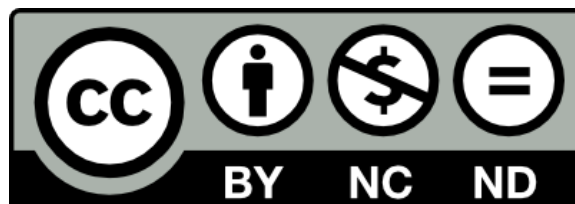
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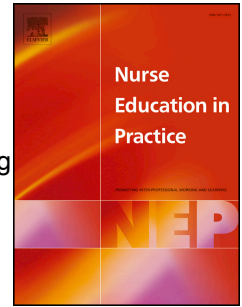


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Structuring educational decisions using the multiple sorting task: An example focusing on international placements in nursing

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Title

Structuring educational decisions using the Multiple Sorting Task: an example focusing on international placements in Nursing

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Abstract

Practical examples of the steps involved in the planning and execution of the multiple sorting task are frequently lacking in published reports. This audited staff activity demonstrates how the multiple sorting task can be used to structure conversations with a group of health professionals planning an international placement for nursing students. Sixteen participants were drawn from diverse professional backgrounds, including academia, clinical practice, government policy, and placement administrators. Participants sorted 17 statements written on cards into categories of their choice and noted why they sorted the cards into these particular groups. Data were analysed using multidimensional scaling and qualitative perspectives. The analysis identified four key themes that detailed the participants' views about international placements. These findings demonstrate how the multiple sorting task can be used to generate information that facilitates the examination of important facets of health care practice that universities could cover in preparing students for international placements.

Keywords: Multiple sorting task; multidimensional scaling; nursing; mixed methods; international placements.

Highlights

- The multiple sorting task facilitates shared decision-making in developing education content
- Sharing priorities in a group context will lead to more cohesive teams which embrace change
- The multiple sorting task can integrate qualitative and quantitative research methods

Introduction

Practical examples of the steps involved in the planning and execution of the multiple sorting task (MST) are frequently lacking in published reports. MST can be undertaken with the use of different materials, including objects, pictures, or statements printed on cards. It is a particularly useful method when the primary objective is to understand how people categorise various entities (Rugg & McGeorge, 2005). This article focuses on card sorts, which involves placing cards, on which statements are written, into similar categorical groups. We provide a working example that may assist researchers who intend to use MST to explore peoples' views about an event, object or experience. We also illustrate how the quantitative analysis of MST data can be enhanced by qualitative information that is often readily available during an interview constructed around a sorting task. This application of the MST occurred in a particular context in which a group of health professionals were planning overseas placements for nursing students.

The process of organizing an overseas fieldwork placement is complex and time consuming and requires a great deal of discussion and debate. The level of complexity can be added to considerably when several organizations work together as in this case. We were drawn to the notion of shared decision making using a sorting

task to make the strands of the discussion process more transparent (Wilson & Canter, 1983).

As each of the participants completed the task it became apparent that some interesting ideas were emerging. After the last of the participants had completed the sorting task, a more detailed analysis was undertaken and it was at this point that we decided to write this article to share our enthusiasm for the MST in facilitating shared decision-making. At the same time we wanted to provide some practical help for those who wished to use the MST in their work whether in a practical problem solving manner or for application in a research project.

Our aim here is to illustrate how the MST was used as an example to others. The example captures four main themes from the participants' conversations about international placements that will be of interest to university staff and students planning an overseas placement. It is appropriate therefore to sketch out this background next, followed by an introduction to the multiple sorting task.

International placements for nursing students

International clinical placements provide valuable personal and professional experiences for student nurses (Button et al, 2005). The main benefits of such placements include learning cultural differences, comparing health systems, comparing nursing practice, enhanced employment prospects and personal development (see for example Kent-Wilkinson et al, 2015).

Adequate planning and preparation are essential to maximize the benefits of international placements. Determinants of successful placements include: preparation before the placement, liaising and planning with host institutions and countries, arranging agreements and insurance, raising funds, establishing support of

appropriately qualified registered nurses and educational institutions while on placement, addressing accommodation and safety concerns, ensuring adequate pre-briefing on the social, cultural and health context; and clear descriptions of the type of clinical situations, skills used on the placement, and the expectations of the health professionals who students will work with (Button, et al., 2005; Gopee, 2008; Grant & McKenna, 2003; Hartigan-Rogers, Cobbett, Amirault, & Muise-Davis, 2007).

The international placement area that was the subject of this project is Tanzania. The Australian Government Department of Foreign Affairs and Trade advises that travellers to Tanzania should “exercise a high degree of caution” and strongly consider health insurance. This advice is provided in the context of the high rate of HIV/AIDS within Tanzania, in addition to outbreaks of many other diseases.

To address issues such as these as well as the normal placement considerations, a group of participants, drawn from different organizations engaged in a series of conversations and planning meetings with the goal of sending 25 students to Tanzania under supervision. Learning how people work together to achieve goals is a vital aspect of professional practice. However, it is also a very challenging process methodologically because it entails bringing together different individuals and working out a shared understanding of group priorities. Some of the recurring themes in conversations were captured in terms of statements that were written onto index cards, coded, numbered and used in a multiple sorting task described below (see Table 1).

The multiple sorting task

Card sorting is an interesting, cost-effective and fun way to learn about how people think. Its origins can be found in personal construct theory and repertory grid

technique (Winter, 2013), and the Q-sort (Ellingsen et al 2010; Serfass & Sherman, 2013). Sixsmith (1986) noted how the MST could also be used within a phenomenological framework to study individual accounts and personal meanings. In an account of the ethnographic approach to interviews, Spradley (2016) describes how different card sorts can be used to understand how informants experience their world in a particular cultural setting. It is very user-centred and helps develop insights into peoples' mental models. In so doing it is possible to arrive at a collective categorisation of ideas from different individuals.

The simplicity and the potential for gathering information in a short time frame makes it an attractive option for clinical research. In particular, the MST provides a robust method to examine how clinicians', or consumers', categorise and prioritise issues when they converse and make decisions about care and work. Sorting cards into categories provides quantitative data in the form of which cards can be counted together, and how often they appear together. In addition, it is possible to record what people say as they sort the cards using notes or tapes as Canter et al (1985) note:

“multiple card sorts might be a self-exploration process in which people revise their choices as they come to a fuller understanding of their conceptual systems or grow in their self-knowledge. This illustrates the importance of capturing the rationale for participant choices through recording their talk-aloud commentary” (p.1425).

The combination of data sources highlights the importance of complementing quantitative data with qualitative data as a way of understanding *why* people sort

things the way they do. This convergence of approaches in research work (Brannen, 2005) is more likely to result in an even richer understanding of participants' views.

Aim

This article aims to describe, through a worked example, how the MST was used in a very practical way to elicit the core constructs and priorities that underpinned conversations and decision-making within the participant group. This illustrative example of the use of the MST, from data collection to final analysis, addresses the lack of practical guidance in the literature about research methods that integrate qualitative and quantitative approaches.

Procedure

Instructions to participants

All members of the participant group were known to each other and engaged in the MST activity with enthusiasm because it provided a way of learning about and recording the views of others that might add value and clarity to the conversations. The participants were informed at the outset that the sorting procedure was not a test - merely a way of accessing their individual views. The statements used in the sorting task were generated from discussions that one of the authors had with nursing professionals at forums about international placements. None of those professionals were involved in the conduct of this staff activity. All of the statements were placed on the table before the individual participants who were asked to sort these into similar categories or groups.

Participants were free to sort the statements into categories that *they* felt were relevant, and they were also asked to explain *why* they sorted the statements into these particular categories. The card numbers in each group and how these were described

as similar by the participants were noted. At the end of the sorting, participants rated each of the statements on a Likert scale from 1 (not important) to 7 (very important) as a way of identifying the relative importance of the individual statements. Participants were invited to complete the task with the following general instructions:

“The task will take about 15-20 minutes to complete. Read through the statements printed on each card. Then sort the cards into piles that are *similar* in some way. Describe how each pile of cards is similar. You can have as many piles as you wish as long as all the cards are sorted and labeled. When you have finished you can gather up the cards again and sort them into different piles. Finally please rate each statement for importance on the scale (1-7) provided”.

Because each of the cards was numbered, it was possible to calculate the frequency with which each pair of statements appeared together in one category across all of the participants. This simple calculation resulted in a lower-half data matrix of the frequencies of co-occurrence for the 17 statements (see Table 2). This was assumed to represent a measure of “similarity” between the sorted cards. Most participants did one sorting of the cards while a few did more than one. Three of the participants sorted the cards a number of times. No limitations were placed on the number of times the cards could be sorted, which enabled the participants to refine the categories until they were satisfied with the manner in which they were conceptualised.

Analysis of the data matrix

A similarity matrix can be difficult to read and relationships between elements or variables (statement cards in this instance) may be hard to detect especially if a large number of variables are involved. The representation of these relationships in a Euclidean geometric space is much easier to read and can help to elicit hidden patterns in the data (Borg & Groenen, 2005). Coxon (1999) noted that a co-occurrence matrix from a sorting task, like the one in Table 2, can be analysed using multidimensional scaling (MDS) which comprises:

“...a family of models where the structure in a set of data is represented graphically by the relationships between a set of points in a space. MDS can be used on a wide variety of data, using different models and allowing different assumptions about the level of measurement” (Coxon, 2004, p669).

MDS then describes a range of models which display the similarities between objects on a spatial map (Schiffman *et al.*, 1981) so that proximities among objects are shown. Kruskal and Wish (1978) define proximity as: “a number which indicates how similar or how different two objects are, or are perceived to be...”(p.7).

MDS has a number of important advantages over other multivariate statistical procedures. First, the procedures can accept input data in various forms (Fitzgerald and Hubert, 1987). Second, the procedures make only ordinal assumptions about the level of data (Rabinowitz, 1975); and third the output is in the form of a spatial representation (or map) of low dimensionality which makes it easier to interpret (Rounds and Zevon, 1983).

Smallest space analysis and interpretation

Smallest Space Analysis (SSA) is one multidimensional scaling program from the Guttman-Lingoes Nonmetric Program Series (Lingoes, 1973) that shows the similarity between elements through the distance between printed points on a map. It is a non-metric procedure and works with nominal or ordinal level data. There are several software packages available to undertake this type of analysis. In this instance the MINISSA procedure from the NewMDSX suite (Coxon et al, 2005) was used.

The accuracy of the geometric representation can be estimated by the coefficient of alienation, which ranges from 0 (indicating a perfect fit) to 1 (worst fit) (Shye et al, 1994). A coefficient of alienation of .2 is acceptable (Brown, 2011) but a clear plausible structure in the depiction is also important.

The HICLUS program is also provided in the NewMDSX suite (Coxon et al 2005) and helps to explore how variables that are similar join together in non-overlapping clusters. This procedure helped in the MDS interpretation. In this instance the same dataset was submitted to HICLUS and generated a hierarchical structure that was used to develop the four region interpretation described below. The clustering solution can be used as a secondary guide to interpreting the map (Paulson et al 1999).

The initial structure arrived at through the SSA and HICLUS analysis was combined with careful consideration of the content of the cards clustered together and the comments made by participants during the sorting task. At first the plot (Figure 1) was examined to see where the cards were located. Cards that were plotted close together are assumed to be similar in some meaningful way while those that were further apart were less similar. Hence card 9 (SOCORI – “A socio-economic orientation is in place”) is plotted well away from card 10 (SOPMIN – “The scope of practice issues are identified and minimized”). Then we examined the types of cards

that were assembled close together to try to tentatively identify a grouping of cards that might convey a particular theme or meaning. We then considered these in light of the verbatim notes made during the conversations with participants who provided phrases and ideas to support their grouping of cards based on similarity. These notes helped us to arrive at the final four regional structure in Figure 1. This layered approach to analysis combining quantitative and qualitative information helps to strengthen the four regions hypothesized.

Findings

A two-dimensional map was produced by MINISSA where the distance between points corresponds with the similarity between the statements as perceived within this group of participants. The printed output from the program is shown in Figure. 1. Note that each of the code names on the printed output corresponds to the number on the list of statements in Table 1. Figure 1 provides a MINISSA representation of the matrix in Table 2 with an acceptable coefficient of alienation of 0.1.

Four main regions were identified on the plot, which captured “needs” or requirements for establishing sound overseas placements. These regions were categorised as: (a) the need for students to achieve competence within their scope of practice, (b) the need to minimize and manage risks to students, (c) the need for universities to prepare the students and the setting, and (d) the need to orientate and support students in the specific practice context. The needs are described fully below to reflect participants’ perceptions of the sorted cards (statements) with some of the phrases and ideas (verbatim) they used to support the way they sorted the cards into particular groups.

The process of asking participants to rate the importance (1-7) of each statement allowed us to calculate an overall mean rating for each of the four regions. In reality these regions cannot be easily weighted, they are all important in planning for successful placement opportunities even if individuals rate things differently.

(a) The need to minimize and manage risks to students

(Importance Rating: 6.38, Rank 1)

The region comprised cards 7, 13, 16 and 17. The occupational health and safety was mentioned by several participants. Moreover, the emphasis here was on the need to “minimise and manage risk” and ensure that significant health and safety issues are addressed and that the “personal wellbeing (physical and psychological safety) of the student” was privileged. Effective risk management meant that the “university must have the structures and processes” needed for “effective planning and organization” of the placement overseas. This required “preparation, providing information, and arranging for all the logistical aspects of the experience including living arrangements so that risks are kept to a minimum”. It was important to be able to have structures in place to “maintain links to the home university”.

(b) The need for students to achieve competence within their scope of practice

(Importance Rating: 6.14, Rank 2)

The region comprised cards 1, 2, 5 and 10. There is an emphasis on “achieving competencies and specific learning objectives through practice”. The competencies “need to be achievable and worthwhile”. The nursing staff in the host placement must understand the role of the student and the scope of practice within that role to “enable

and support the students effectively”. It was felt that difficult issues such as “legal concerns within the placement need to be identified and addressed” so that students on international placements have opportunities to “practice competencies in the clinical setting”. It might be difficult to “assess the capacity to meet students’ learning requirements in an overseas placement”. The placement was also about “nursing professionalism” and “preparing the student for a clinical role in the future” as a member of the nursing profession.

(c) The need to orientate and support students in the specific practice context

(Importance Rating: 5.80, Rank 3)

The region comprised cards 3, 4 and 6. This region stresses the need for an orientation to the specific care setting, clinical supervision, and the resources needed to support teaching and learning in the practice context. Students needed to know about the clinical “care specifics in the culture” so that they can “provide appropriate care with support”. They need to “know about clinical care in the host country”. Hence the students need “real support” in-situ during fieldwork and probably more than is normally the case and this will be “essential for clinical learning”. Students need the “support and resources available in the host country” as well as the “support and supervision provided by the university”. This will ensure that the care provided by students is correct, that students can achieve learning goals, and that the specific experience as a whole will help to prepare students for registration as a nurse.

(d) The need for universities to prepare the students and the setting

(Importance Rating: 5.58, Rank 4)

The region comprised cards 8, 9, 11, 12, 14 and 15. In this region the preparation and institutional support for students while overseas is emphasized. These also underpin the learning experience. Preparation entails an “awareness of the social-economic and cultural context” and how these affect health care in the host country. Difficulties around “general safety (including emotional safety), communication and language in particular” need to be addressed, while “satisfactory arrangements for communications with home must be put in place by the university or institution” beforehand. Students will also require an orientation “in country” to the setting and the culture to learn how to respond to cultural mores appropriately. The students “living circumstances overseas” need to be appropriate. There is a need to “develop cultural awareness and preparedness about travelling to a new country”.

Discussion

The primary purpose of this article was to provide a detailed, practical example that illustrated how the MST could be used to simultaneously collect quantitative and qualitative data. This worked example provides guidance on the use of the MST to researchers who wish to use quantitative and qualitative data in a complementary manner, and addresses an important gap in literature given the lack of pragmatic descriptions of these methods.

The MST has been used to explore a wide range of health-related issues. In a study to explore barriers to and facilitator of evidence based practice in a mental health service, Green and Aarons (2011) asked participants to sort statements, rate their importance and potential for change, and later analysed these using MDS. Storfjell & Cruise (1984) developed a model of community nursing by brainstorming a large number of activities and behaviours, before refining them and undertaking a

MDS, which yielded a general model that highlighted three major domains of care. Another example by Morrison and Bauer (1993) used the MST to explore practicing nurses' perceptions of their work in a German context, whereas Crow & Spicer (1995) used sorting procedures to explore nurses' clinical knowledge and judgments.

Despite the wide range of applications, limited literature is available to offer guidance about the practical issues involved in using sorting tasks. Rugg and McGeorge (2005) provide a practical example of card sort processes, whereas Whaley and Longoria (2009) offered a detailed account of how to prepare card sort data for multidimensional scaling analysis. However, no previous articles have integrated a worked example of MST with an explanation of how the generated data can be analysed with the use of MSD. Our study addresses this gap in the literature.

We propose that the MST offers great potential for exploring important facets of health care practice such as inter-professional teamwork and patient safety, particularly through blending qualitative and quantitative information that has been collected at the same time. Also, sorting tasks can be used to promote more effective communication in a team setting. Leonard et al (2004) noted how effective communication can be fostered using standardized tools to enhance teamwork and reduce risk – a simple sorting activity could be used in this way too, especially when accommodating a range of individuals with a shared common purpose.

In addition to its use as an analytical tool, MST provides several pragmatic advantages. Although the participants had not been previously exposed to MST, they found that the procedure was quick and simple. Also, it resulted in a substantial amount of qualitative data which did not need to be transcribed, and the coding procedure required to undertake the SSA was much less time consuming in

comparison to common qualitative coding methods such as procedures used in grounded theory.

Limitations

Some of the comments that the participants made about why they placed cards into certain groups were brief and somewhat limited. There are several techniques that could be used in conjunction with MST to elicit more detailed accounts of the participants' reasoning. One such method involves the think aloud technique, which is especially useful in accessing working memory and thereby capturing immediate reactions and the information used while undertaking a task (Lundgrén-Laine & Salanterä, 2010). Another complementary method is laddering, which can be used to clarify the meaning participants attribute to terms, and also understand how people group things into categories (Reynolds & Gutman, 1988).

A second potential limitation is the need to learn about the use of MDS and the types of software available, which can be off-putting to the beginner. However, there are several accessible information sources available such as Coxon (2004) or Spencer (2009).

Conclusion

MST can be used to elicit a common theoretical underlying structure shared across a group of people. It can embrace both qualitative and quantitative data to learn how people use categories in their everyday lives – categories which shape our interactions with, and understanding, of others. MST can also be used in an open (participants provide the categories) or closed (the researcher provides the categories) manner, depending on the study's purpose and what is known about the topic under

investigation. In particular, the use of a MST results in a closer integration of quantitative and qualitative perspectives, leading to a more “pragmatic” approach to research generally. The worked example of the MST described here might help to make the task of embracing a more pragmatic standpoint more accessible to researchers and clinicians alike.

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Table 1 The statements used in the sorting task

<i>Card No</i>	<i>Statement</i>	<i>Code name</i>
1	The placement enables students to achieve the ANMC competencies	ANMCOM
2	The placement enables students to achieve specific student objectives	STUOBJ
3	A clinical orientation program is in place	CLIORI
4	Clinical supervision is readily available	CLISUP
5	The placement nursing staff understand the student role & scope of practice	NURSOP
6	Resources to support teaching and learning are available	SUPTAL
7	A OHS risk minimisation plan is in place	RISMIN
8	A cultural sensitivity preparation program is in place	CULPRE
9	A socio-economic orientation is in place	SOCORI
10	The scope of practice issues are identified and minimised	SOPMIN
11	Interpreters are available if required	INTAVA
12	The living arrangements are satisfactory	LIVARA
13	The safety risks have been identified and minimised to an acceptable level	RISKAC
14	Methods of communication with home are readily available	COMAVA
15	In country support is readily available	COUSUP
16	The evacuation process has been identified	EVACPR
17	The university contact processes has been established	UNICON

Table 2 Section of the lower-half co-occurrence data matrix for 8 of the 17 cards

<i>Card No</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
<i>1</i>							
<i>2</i>	18						
<i>3</i>	9	9					
<i>4</i>	10	10	13				
<i>5</i>	12	11	8	7			
<i>6</i>	10	12	7	13	7		
<i>7</i>	3	2	3	3	3	2	
<i>8</i>	3	3	6	4	6	7	5

ACCEPTED MANUSCRIPT

ACCEPTED MANUSCRIPT

Figure 1 2D MINISSA solution for 17 statements partitioned into four regions

