

IDENTIFICATION OF CORE COMPETENCIES

FOR CAREER PLANNING:

A CASE STUDY ON ARMY TRAINING PERSONNEL

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Abstract

The aim is to identify core competencies that can be used to fit education and development of personnel to the organization needs. To do so, six theoretical assumptions about competencies were adopted. Competencies are: indivisible clusters of skills, knowledge, conduct, attributes and notions; context dependent; connected to activities and tasks; flexible in time; acquired by learning and development; and related to each other. The study group (n=28) consists of training personnel within the Royal Netherlands Army. A card-sort technique was introduced as a method to identify the core competencies. Participants sorted competence statement cards on their importance for their functions. Using principal component analysis, five core competencies could be identified. It can be concluded that the card-sort technique could provide six theoretical assumptions about competencies with a practical filling-in.

Keywords: Competencies; Card-sort; Career development; Army; Competence identification; Personnel; Factor analysis; Simulators, Instructors, Analysts, Trainers; Scenario writers;

Introduction

Background

In the last decades, the concept 'competencies' has been considered a valuable one to match organizational job needs with individual experience and performance (e.g. (Miller, Scully, & Winstead, 2003; Whan Marko & Savickas, 1998; Salas, Milham, & Bowers, 2003). The use of competencies in the workplace implies that the components of effective job performance can be clearly isolated and identified. Once identified, competencies may help organizations to fit education and development of their personnel to the organization needs (Garavan & McGuire, 2001). In practice, however, identification of competencies is hampered because a widespread definition or theoretical framework is lacking. From a constructivist point of view, it is better to abandon the quest for one absolute meaning of competence. Instead, it is considered more fruitful to search for a common ground among the various definitions (Stoof, Martens, van Merriënboer, & Bastiaens, 2002). According to van Merriënboer, et al. (2002) there is a growing consensus on 6 aspects of competencies: they are (1) indivisible clusters of skills, knowledge, conduct, attributes and notions, (2) context dependent, (3) connected to activities and tasks, (4) flexible in time (5) acquired by learning and development and (6) related to each other (van Merriënboer, van der Klink, & Hendriks, 2002). These aspects are considered useful theoretical assumptions, but do give ample guidance in the identification of the specific competencies needed for career planning and education. Therefore, a case study is performed in which the before mentioned six aspects are put into practice. The aim of this study is to identify job-related core competencies of four related function groups within the Royal Netherlands Army (RNLDA). Core competencies can be used to help RNLDA to fit education and development of their personnel to the organization needs. In addition, a card-sort technique was introduced as an identification method. This method's usefulness is discussed in relation to

the six theoretical assumptions about competencies.

Six theoretical assumptions about competencies in practice

To start with, we embrace the first theoretical assumption that competencies are indivisible clusters of skills, knowledge, conduct, attributes and notions. To stress the possibility of the use of competencies for organizational use, this paper is directed at core competencies. These are competencies deemed to be essential for certain tasks or functions (Miller et al., 2003; Case, 2003).

In this paper core competencies are defined as clusters of knowledge, skills and conduct that are necessary for task performance and problem solving needed to fulfill an occupation, function or role (Veldhuis, van de Laak, & Berlo, 2002).

The second assumption concerns the context dependency of competencies (van Merriënboer et al., 2002). As a research context, the education and training department within the Royal Netherlands Army (RNLDA) is chosen. In this context, there is a growing need for education and training personnel who are able to integrate simulators into army training. Currently, within the RNLDA education and training personnel are already using simulators, occupying different functions in the so called Modeling and Simulation (M&S) area. Until now it is unclear which competencies lie hidden beneath M&S functions. The identification of the competencies needed for these functions might guide career development within and towards the M&S area.

Thirdly, competencies are assumed to be connected to activities and tasks (van Merriënboer et al., 2002). This assumption hinders identification within the M&S area, because the various M&S functions differ to a large extent in the way and the level on which simulators are brought into action. Some personnel operate complex simulators that are used in large exercises, whereas others use simulators instrumentally during instruction activities. In addition, they are dealing at least four kinds of simulators with very different possibilities: To

start with, there are live field simulators: regular military systems that are equipped with instruments for simulating combat activities (e.g. Field training exercises). Next, there are constructive simulators, in which whole units are simulated to train cooperation and communication skills (e.g. Commando post exercises). Furthermore, virtual simulation environments simulate complete systems operating on virtual terrain for real-time training (e.g. tactical indoor training). The last to mention are PC-based simulators that can be used to visualize various military action scenarios, or to train individuals or small groups by means of PC-games. The result is a large diversity of activities and tasks. It is unclear if there is enough common ground for shared competencies.

Identification of competencies becomes even more complicated when considering the fourth theoretical assumption that they might be flexible in time (van Merriënboer et al., 2002). This may concern flexibility in the application of a competence, as well as the level of experience with a certain competence. Flexibility is specifically relevant for the study group. M&S personnel regularly change between operational and educational functions during their military careers in the RNLDA. Consequently, they may have to apply their competencies in different situations. Even when they fulfill a function in the area of military education and training, they may successively work with different types of simulators in different functions.

Fifthly, it is assumed that competencies can be acquired by learning and professional development (van Merriënboer et al., 2002). In the M&S situation, most military simulators are customized and lack a standard training program. Instead, M&S personnel acquire the necessary competencies mostly by on-the-job experience. People may differ in the amount of competencies they master, or in the level of mastering. For instance, an expert will have a higher level of competence or more competencies than a novice. In general, development is directed to expert or excellent competence mastering; greater individual competence ensures that both personnel and the organization are more productive and effective (Case, 2003). However, in some situations it is useful to formulate a threshold standard for competencies.

This refers to a minimal competence, for instance as minimal requirements for new employees, or an acceptable level after training (Salas et al., 2003). Because RNLDA personal change functions regularly during their military careers, both threshold and expert competencies are relevant.

Sixthly, competencies are related to each other and the acquisition of one competence often relies on the competencies already present (van Merriënboer et al., 2002; Kemp, Moerman, & Prieto, 2001). Preferably, career planning takes into account this interdependence, so that the succession in the acquisition of competencies corresponds with the requirements for consecutive functions.

Identification of core competencies

An identification technique is needed in line with the before mentioned theoretical assumptions. Two identification approaches are often used: First, a hierarchical task analysis which aims at a decomposition of job functions into tasks, goals, necessary knowledge, skills and conduct (Annet, 2000; Carlisle, 1986). Second, a cognitive task analysis, which primarily aims at revealing knowledge structures, cognitive processes and goals that underlie working behavior. As such, hierarchical task analyses start from a job characteristics perspective and cognitive task analyses emphasize individual differences (Annet, 2000). A combination of both approaches enables identification of competencies according to the first three theoretical assumptions, namely: indivisible clusters; context dependent; connected to activities and tasks.

Several techniques can be used to gather information for task analysis: for instance interviews, behavior observation, document analyses and expert consultation or consensus (Tate, Foulkes, Neighbour, Champion, & Field, 1999; Van Der Heijde & Van Der Heijden, 2006). An alternative procedure is a card-sort method, also known as q-sort (Caldwell & O'Reilly, 1990). Card-sorts involve the placement of cards with concepts or statements into piles, on the basis of how a participant feels they are related. When a card-sort method is used

for identification of core competencies, competency statements can be placed on the cards. When participants sort these cards, the relationships between statements will lead to identification of the core competencies. As such, the procedure accounts for the sixth assumption that competencies are related to each other.

In general, card-sort techniques are much less time-consuming than other methods (Cooke, 1994). Former research with this technique suggests that people are able to sort a large number of separate cards (Caldwell et al., 1990). The technique is particularly useful for identifying the common ground between a larger and diverse collection of competencies within a large and diverse group of participants (Caldwell et al., 1990). Functions within the area of M&S can be characterized as a very diverse group, which makes a search for common grounds in working with simulators a challenge. When core competencies are identified that are relevant for all functions in the area of M&S, career paths can be recommended that may facilitate the development of necessary competencies for working with simulators (Caldwell et al., 1990). Therefore, in this paper a card-sort technique is used to identify the competencies that are needed for the functions within the area of M&S and to investigate how these can be used for career planning and education. In this way, the theoretical assumptions about competencies are provided with a practical filling-in.

Method

Participants

Participants were army personnel (n=28) working within the Modelling & Simulation area (M&S). This group included the following function groups: scenario writers (n=6) who write scenarios for simulators; instructor/operators (n=10) who operate the systems and explain its use to trainees and trainers; observer/trainers (n=8) who observe and train army units with or without simulators during exercises; and analysts (n=4), who analyze the results of simulator

use and report them to the trainers or trainees.

The average age of the participants was 44 years (range: 25-54). Military rank varied from Staff Sergeant to Major and participants had on average 8 years of experience within the M&S area (range: 0.5-20) of which on average 4 years at the current function (range: 0.5-14). All but two of the observer-trainers had experience with simulators, 59% with more than one.

[insert Table 1 about here]

Measurement and study design

Semi-structured interviews with four experienced M&S staff members and a document study of job descriptions, resulted in a list of 15 competency topics (see Table 1). For each topic about 4 statements were formulated in such a way that knowledge, skills and conduct were present, as recommended in assumption 1. The statements were placed on individual cards, resulting in a set of 65 cards. Together with the set of cards came five envelopes with the labels 'not important', 'somewhat important', 'important', 'very important' and 'essential'. A participant could express the importance of a competency statement by assigning cards to envelopes. In this way, a 5-point Likert-scale was created for each statement.

Once the set of cards was developed, it was presented to an experienced M&S staff member (rank: Lieutenant Colonel). He was asked to review the statements to ensure that they were clear and that the set was complete. This review resulted in some adjustments to statements, to make them somewhat more specific to the M&S situation. The final set was copied into two identical sets of cards and envelopes for each participant.

Due to scheduling limitations, the 28 M&S personnel participated in six different sessions each including two individual measurements (round 1 and 2) and group measurements (round 3). In round 1, each participant was asked to sort the 65 cards on their importance for one of the functions. In round 2 they were asked to sort the other set according to the minimal

requirements needed for application for this function. Next, in round 3, a group discussion with participants included the following themes: a reflection on the usefulness of the competency cards for describing their function; ideas about the (ideal) career path within M&S using competencies; necessary education and training to develop the competencies. These three rounds may shed light on the acquired flexibility and developmental possibilities, as required according to assumption four and five.

Analysis strategy

For each competence statement, scores indicating importance were collected (0=not important, 1=somewhat important, 2=important, 3=very important, 4=essential). A factor analysis (Principle Component analysis with Varimax rotation) was used to identify the core competencies. By using a factor analysis for data reduction, a small number of issues could be identified that explains most of the variance observed in the larger number of item scores. To identify the core competencies across rounds, the data were reorganized as follows: the columns of the data matrix contained the 65 competency statements and the rows the importance scores of round 1 and round 2, placed below each other. Thus, the data matrix contained 56 rows, each subject appearing two times. Next, to determine the intra-item reliability of statements within each factor, a Cronbach's alpha was computed for each round separately. Scale scores for each factor were obtained by adding item scores within the scale, and transforming crude scale scores linearly to a 0-100 range, with higher scores indicating more importance. Differences between function groups with respect to the core competencies were tested by Multivariate Analysis of Variance for General Linear Modeling (GLM, a procedure comparable with MANOVA (SPSS, 2001)). To compare between round 1 and 2 -- within and between function groups -- Repeated General Linear Modeling was used, an extension to GLM. The possible influence of background variables (age, military rank, years of experience within M&S, years at the current function, experience with (one of the) simulators)

was tested in two steps: first, Pearson's correlations were calculated to test for a univariate relationship between background variable and core competencies. Second, each background variable with a significant correlation was added as a covariate for the GLM tests, to correct for initial differences between participants.

The results from the round 3 discussions in the six different sessions were categorized and summarized according to content.

[insert Table 2 about here]

Results

Implementation of the card-sort procedure

Although we distinguished four function groups, in practice personnel combine one or more function, sometimes even outside the M&S area. Therefore, participants were asked to sort the cards with their main function in mind. During round 3 participants reported that this complicated the sorting: competencies important for their own job within the M&S area had to be separated from the competencies important for the function of choice. Nevertheless, the participants sorted the cards with competency statements at a high pace: each round of 65 cards took about 5 to 15 minutes. Most participants were positive about the procedure and preferred it to a standard questionnaire.

Relevance of the competency statements

The statements were labeled important to very important ($M=2.2$, Median=2.3), which supports the validity of the selected competency statements. Face validity was confirmed during group discussions: participants agreed that the competency statements were relevant for their functions. Three extra statements were mentioned of which two emphasized the importance of enjoying the function: enjoying education and training and enjoying technical

systems and computers. The third extra statement came down to: communicates with a simulator course participant without visual contact. According to the card-sort, only two statements were seen as not important, both from the competency topic ‘Simulators’: “Executing technical maintenance on a certain simulator” (M=0.2, SD=0.5) and “Performing maintenance on software of a certain simulator” (M=0.5, SD=0.9). During the group discussions participants explained that maintenance is performed by specialists, mostly from the company that supplied the simulator.

Core competencies

As can be seen in Table 2, the principal component analysis resulted in five core competency factors, together explaining 53% of the variance. A higher explained variance indicates that the clustering of cards within a factor is very strong. This suggests that the factor is relevant. On the other hand, higher means indicate higher importance of factors for a M&S function. For instance, the factor ‘Using simulators’ is the result of a strong clustering of cards that contained a reference to a simulator. Even a card that was originally considered to cover the competency topic ‘didactical organization’ (see example Table 2) appeared to cluster within this factor. However, the overall mean is lower, indicating that this factor is ‘somewhat important’ for the M&S functions in general. As can be seen in Table 2, the Cronbach’s alphas of the five factors are high. In general, an alpha larger than .70 is regarded as satisfactory for drawing conclusions about different groups {ref!}. According to round 2 scores, the factor ‘Teaching and Organizing’ had the only alpha lower than .70. This indicates that this core competence is considered less relevant as a minimal requirement for job application.

Relationships with background variables

According to the Pearson analyses, age and experience with simulators in general did not relate to the core competencies. The following background variables had a univariate

relationship with some of the core competencies: military rank, years of experience within M&S, years at the current function and the simulator 'TACTIS' (a virtual simulation environment for tactical indoor training). These variables were added to the GLM-analyses as covariates. Only years at the current function continued to have a significant influence on group differences for the core competency 'Using simulators' during round 1 ($F=4.493$, $df=1$, $p=.047$): the longer personnel had been working at the current function, the more 'Using simulators' was regarded as important for the function.

Importance for the function versus minimal requirements for application

During group discussions it became clear that most current M&S personnel were quite inexperienced in working with simulators at the time of job application. On-the-job training improved their experience level in time. Nevertheless, there were no significant differences between the round 1 and round 2 scores. The M&S personnel attached the same importance to the competency statements, regardless of experience with the function. Therefore, in the following the presentation of statistical analyses is limited to round 1 scores.

[insert Figure 1 about here]

Differences between M&S functions

Figure 1 shows the estimated marginal means (means corrected for background variables) of group scores during round 1. The four functions had significantly different competency profiles ($F=2.836$, $p=.003$), in particular for 'Using Simulators' ($F=3.105$, $p=.05$) and 'Coaching' ($F=3.785$, $p=.03$). The following profiles emerged from the data: Instructor/operators attached the most importance to "Using Simulators". Both instructor/operators and observer/trainers emphasized the importance of 'Coaching', and scenario writers regarded 'Accurate planning and documentation' as most important. All

functions, including the analysts, considered 'Advising' as very important; there were no significant differences between groups. The same goes for 'Teaching and Organizing', which was considered important for all groups.

Discussion

Core competencies for career path planning

Four different functions were profiled with the same set of items and therefore, career paths among the functions can potentially be identified (Caldwell et al., 1990). The current practice within the field of M&S to start as an observer/trainer is not supported by the results. Instead, the profiles of core competencies for each M&S function suggest a career path in which the core competences 'Advising' and 'Teaching an Organizing' are essential for all four functions. Building on this basis, there seems to be a differentiation in three paths. First, a typical education and coaching path with core competencies 'Coaching', more or less corresponding with the function of observer/trainer. Second, a technical support path with emphasis on the core competency 'Using Simulators', with as main function instructor/operator. Third, a path can be formulated that concentrates on scenario development with the core competency 'Accurate planning and documentation', specifically applicable for scenario writers.

It appeared that M&S personnel have to rely on informal on-the-job training. This study identified the core competencies needed, which can be used for training in future. Two approaches can be distinguished in the education of competencies: competencies as outcome and competencies as educational concept. In the first approach the outcome should be an indivisible cluster of skills, knowledge, conduct, attributes and notions, but the training may be directed to these aspects one by one. In the second approach, the assumptions that apply to the competence itself, apply to the educational concept as well. This is also known as competency-

based learning. It implies a whole task -- or authentic task-- training approach and a training context that corresponds with the context the competence is meant for (Croock, Paas, Schlanbusch, & van Merriënboer, 2002). Because M&S personnel are used to be trained on the job, it is most likely that a competency-based learning approach is the best match. The core competencies and their underlying competency statements, can be used for selecting whole tasks to be used for on-the-job training (Boot, van Merriënboer, & Theunissen, 2007). Performance on these whole tasks can be used to assess the ability of personnel to use the trained competencies during their function (Salas et al., 2003). An e-Portfolio, registering the progress on what are identified as core competencies could be helpful in this (LaCour, 2005).

It is known that congruence between person and job increases job efficiency and job satisfaction. The set of cards used for function profiling can be used to get ratings of applicants (Caldwell et al., 1990). Preferably, more than one sort will be performed for each individual being assessed, to increase reliability and to overcome the limitations of self-ratings (Lowman & Williams, 1987; Kelso, Holland, & Gottfredson, 1977; Van Der Heijde et al., 2006). For instance, next to self-rating, a rating of a supervisor and a rating of a peer could be used (Salas et al., 2003).

Identification of core competencies using a card-sort

In this study a card-sort technique was used to provide the theoretical assumptions about competencies with a practical filling-in. It was possible to identify competency statements that according to participants were relevant for their functions. The statements described indivisible clusters of skills, knowledge, conduct, attributes and notions (assumption 1), and were connected to activities and tasks (assumption 3). As expected, the participant did not have problems with sorting the large set of statements. A card-sort procedure departs from other job analysis methods in that an attempt is made to identify all competencies related to performance, not just those that are defined a priori as most important (Caldwell et al., 1990).

The card-sort procedure used in this study can be characterized as a restricted one, because participants were asked to choose between categories of importance. An alternative form of card-sort administration is known as free sort, because the participant is allowed to make as many piles of related cards as he or she deems necessary. Next, the research administrator may then ask the participant to label the piles on the basis of their characteristics or content (Harper et al., 2003). In our restricted card-sort procedure, we were able to perform factor analyses to find clusters of related statements. In this way, the card-sort does not rely so much on the categorization skills and ideas of the participants. This restricted procedure makes a card-sort useful for a sample with various levels of education and experience.

The context dependence of the competencies (assumption 2) was supported as well: the statements were considered relevant for the M&S context. The four M&S function groups differed in the relative importance attached to the resulting core competences that were nevertheless considered important to all.

Results were less straightforward for the assumption that competencies should be flexible in time (assumption 4) and can be acquired by learning (assumption 5). A difference was expected in the importance of the competency statements based on experience on the job. Therefore, in two rounds we studied the differences between competencies needed for full function performance and for minimal requirements during application. However, this difference was not found. In contrast, the participants stressed that on-the-job training was necessary for most current M&S personnel because they were quite inexperienced in working with simulators during application to their jobs. Moreover, the longer personnel were working at the current function, the more 'Using simulators' was regarded as important for the function. This contradiction in findings indicates that the procedure followed -- using one sample that in retrospect decides on minimal requirements -- is not sufficient in detecting if the core competencies were flexible in time and could be acquired by learning (assumption 4 and 5). Future research could for instance, study the competence profile of persons just engaged in the

function, or to check the minimal competence requirements according to the selection committee. Another limitation of the procedure followed is that it focused on importance of competencies, but not on the required level of mastering (Veldhuis et al., 2002). The card set used in current research can be used as a basis for further elaboration on what levels of mastering are necessary for adequate function performance.

Conclusion

In line with the aim of this study, it was possible to identify five job-related core competencies for training personnel in the M&S area within the RNLDA. A career path differentiation was recommended and several ways of fitting personal competencies with job requirements were discussed. It is known that if organizations boost optimism about career planning, it positively stimulates career choice attitudes and competencies (Whan Marko et al., 1998). The results of this study can help the RNLDA to effectively fit education and development of their M&S personnel to the organization's needs.

In this paper, a card-sort technique was introduced as an identification method. This generic method is considered useful for more organizations than the one under study in this paper. It can be concluded that the card-sort technique could provide six theoretical assumptions about competencies with a practical filling-in.

Reference List

Annet, J. (2000). Theoretical and pragmatic influences on task analysis methods. In J.M.Schraagen, S. F. Chipman, & V. L. Shalin (Eds.), *Cognitive task analysis* (pp. 25-37). Mahwah, NJ, USA: Lawrence Erlbaum Associates.

Boot, E. W., van Merriënboer, J. J. G., & Theunissen, N. C. M. (2007). Improving the development of instructional software: Three building-block solutions to interrelate design and production. *Computers in Human Behavior, In Press, Available online 10 July 2007*.

Caldwell, D. F. & O'Reilly, C. A. (1990). Measuring Person-Job Fit With a Profile-Comparison Process. *Journal of Applied Psychology, 75*, 648-657.

Carlisle, K. E. (1986). *Analyzing jobs and tasks*. Englewood Cliffs, New Jersey: Educational Technology Publications Inc.

Case, D. A. (2003). *Antecedents and outcomes of end user computing competence* (Rep. No. ADA415162). Air Force Inst of Tech Wright-Patterson Afb OH School of Engineering and Management.

Cooke, N. J. (1994). Varieties of knowledge elicitation techniques. *International Journal of Human-Computer Studies, 41*, 801-849.

Croock, M. B. M. d., Paas, F., Schlanbusch, H., & van Merrienboer, J. J. (2002). ADAPT-super(IT): Tools for training design and evaluation. *Educational Technology Research & Development, 50*, 47-58.

Garavan, T. N. & McGuire, D. (2001). Competencies and workplace learning: Some

reflections on the rhetoric and the reality. *Journal of Workplace Learning*, 13, 144-164.

Harper, M. E., Jentsch, F. G., Berry, D., Lau, H. C., Bowers, C., & Salas, E. (2003). TPL-KATS-card-sort: A tool for assessing structural knowledge. *Behavior Research Methods, Instruments, & Computers*, 35, 577-584.

Kelso, G. I., Holland, J. L., & Gottfredson, G. D. (1977). The relation of self-reported competencies to aptitude test scores. *Journal of Vocational Behavior*, 10, 99-103.

Kemp, J. L. C., Moerman, P. A., & Prieto, J. (2001). On the nature of knowledge-intensive organisations: strategy and organisation in the new economy. In Thoben, Weber, & Pawar (Eds.), Bremen.

LaCour, S. (2005). The Future of Integration, Personalization, and ePortfolio Technologies. *Innovate, Journal of Online Education*, 1, id.85.

Lowman, R. L. & Williams, R. E. (1987). Validity of self-ratings of abilities and competencies. *Journal of Vocational Behavior*, 31, 1-13.

Miller, S. I., Scully, J. H. J., & Winstead, D. K. (2003). The Evolution of Core Competencies in Psychiatry. *Academic Psychiatry*, 27, 128-130.

Salas, E., Milham, L. M., & Bowers, C. A. (2003). Training Evaluation in the Military: Misconceptions, Opportunities, and Challenges. *Military Psychology*, 15, 3-16.

Stoof, A., Martens, R. L., van Merriënboer, J. J. G., & Bastiaens, T. J. (2002). The boundary approach of competence: a constructivist aid for understanding and using the concept of competence. *Human Resource Development Review*, 1, 345-365.

Tate, P., Foulkes, J., Neighbour, R., Champion, P., & Field, S. (1999). Assessing physicians' interpersonal skills via videotaped encounters: A new approach for the royal

college of general practitioners membership examination. *Journal of Health Communication*, 4, 143-152.

Van Der Heijde, C. M. & Van Der Heijden, B. I. J. M. (2006). A competence-based and multidimensional operationalization and measurement of employability. *Human Resource Management*, 45, 449-476.

van Merriënboer, J. J. G., van der Klink, M. R., & Hendriks, M. (2002). *Competenties, van complicaties tot compromis: Over schuifjes en begrenzers [Competencies, from complications to compromises; about tuning knobs and limiters]*. Den Haag, The Netherlands: Onderwijsraad.

Veldhuis, G. J., van de Laak, C. G. M., & Berlo, M. P. W. v. (2002). *Competenties van instructie technici binnen de Koninklijke Marine [Competencies of instructors of the Royal Netherlands Navy]* (Rep. No. TM - 02 - A006). Soesterberg, the Netherlands: TNO Human Factors.

Whan Marko, K. & Savickas, M. L. (1998). Effectiveness of a Career Time Perspective Intervention. *Journal of Vocational Behavior*, 52, 106-119.

Table 1 Content of the set of 65 competency cards

Competency topics	N° of cards	Example
Accuracy	2	Works accurate and faultless with details
Advising	4	Includes the viewpoint of the commander/ army unit in problem solving activities
Analyzing	4	Connects different information
Coaching	5	Stimulates others to find their own solutions
Didactical organisation	5	Plans lessons, using the possibilities of a simulator
Educational material development	4	Develops educational and practice materials and simulator exercises
Empathy	4	Shows consideration for the verbal and non-verbal reactions of others
Managerial	4	Shows trust towards a person whom a task is assigned to
Knowledge sharing	4	Easily shares information, knowledge and experiences with other.
Learning behaviour	4	Learns from own and other's experiences
Army Operations	3	Shows knowledge of tactical operations
Organisation/ Planning	4	Plans and organises own work or work of others
Renewal	3	Invents solutions for bottlenecks during work
Simulators	9	Has the relevant background knowledge of a certain simulator
Teaching/ Communication	4	Verifies if the message has come across by asking questions

Table 2. The five core competencies for the M&S functions

Core competencies	N°. of cards	Example	Factor analysis: Explained variance	Alpha's (Round 1/2)	Grand Mean ^a	
					M	(SE)
Using simulators	15	Translates learning goals into the possibilities of a certain simulator	15%	.93/ .93	39	(5)
Coaching	17	Stimulates others to find their own solutions	14%	.90/ .94	54	(3)
Advising	12	Includes the viewpoint of the commander/ military unit in problem solving activities	9%	.84/ .91	62	(3)
Teaching and Organising	9	Shows insight in the armies learning strategies	8%	.83/ .60	56	(3)
Accurate planning and documentation	7	Documents information and files well-organized	6%	.78/ .70	58	(3)

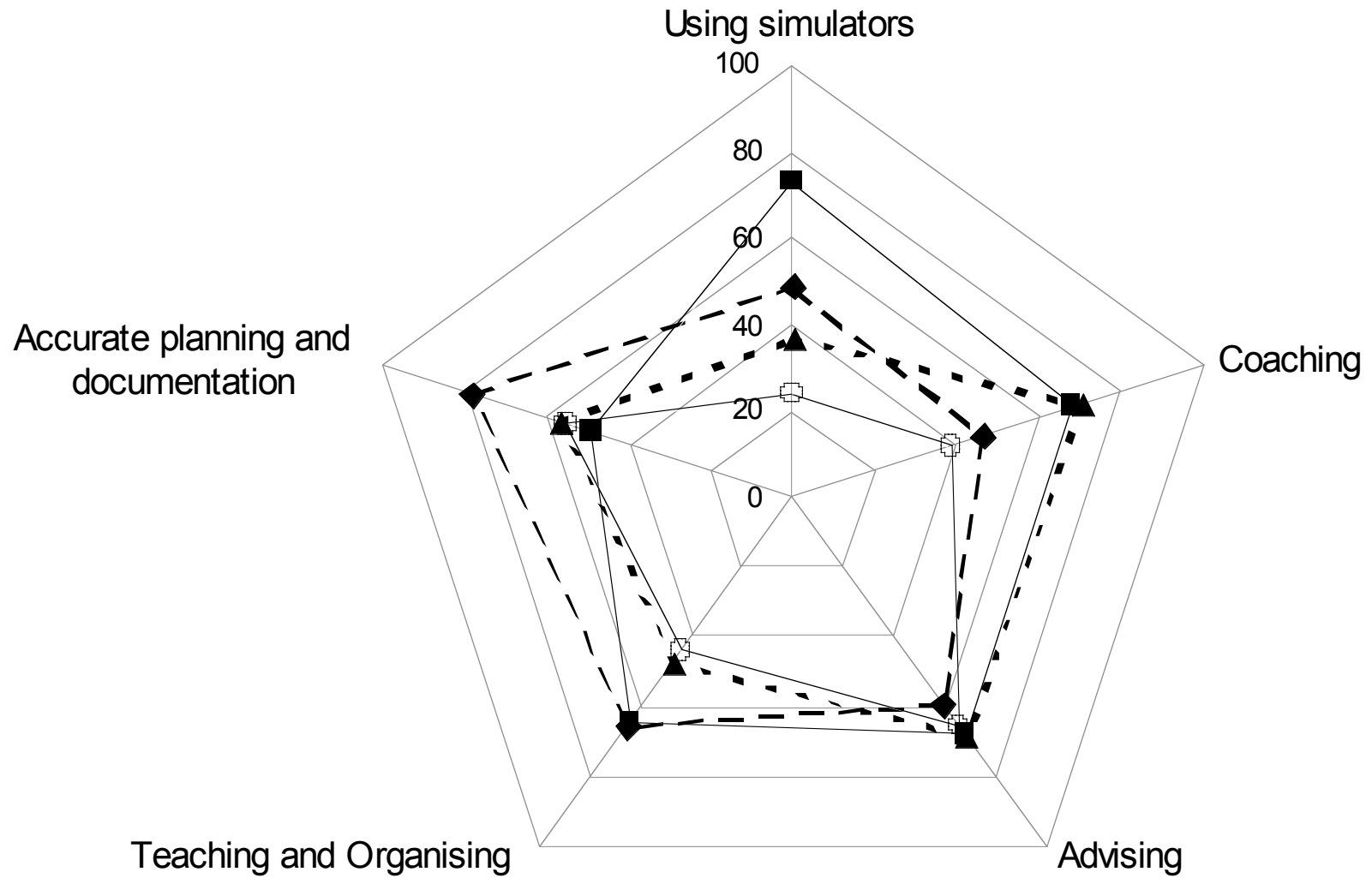
^a Overall estimated marginal means corrected for background variables and round.

M(SE)=Mean (standard error): 0-20=not important, 20-40= somewhat important, 40-60=important, 60-80=very important, 80-100=essential.

Figure caption

Figure 1: Function profiles of main competencies

Legend Figure 1: 0-20=not important, 20-40= somewhat important, 40-60=important, 60-80=very important, 80-100=essential.



— ◆ — scenario writer

— ■ — instructor/operator

- ▲ - observer/trainer

— □ — analyst