Learning to Evaluate Multi-Disciplinary Emergency Management Teams

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ABSTRACT

Emergencies can vary considerably in nature and may call upon different kind or organizations. The need for multi-disciplinary cooperation in general, and civil-military cooperation in specific, is still increasing. Training of multi-disciplinary emergency management teams is becoming more common practice. Nevertheless, the value of these trainings and exercises is questionable. Although scenarios are quite often realistic and challenging to the trainees, the degree to which they can really learn from these experiences depends on more than just the realism. The training situation may be too complex to get a good understanding of the team's performance. A solid evaluation afterwards is therefore of utmost importance. However, an effective evaluation requires expert-evaluators. In many cases evaluators are themselves experts in the field, but that does not automatically guarantee them to be expert-evaluators. They need to be able to not only observe and diagnose the team's performance, but also to give feedback in an effective and structured way. Improving the competencies of evaluators is therefore conditional for increasing the effectiveness of multi-disciplinary exercises from a learning perspective. Supported by the Dutch Home Office, a six-day course was developed combining practical experience and results of scientific research. The trainees learn more about observing multi-disciplinary team performance, conducting an evaluation with the team, and writing an evaluation report. Hands-on experience is combined with short theoretical reflections. Afterwards, the trainees follow an interactive examination during which their performance is assessed by two independent examiners. Up to now, six courses have been conducted and more are to come. Every course is evaluated based on which the next course is improved. Trainees come from first responder organizations, the military and other organizations (e.g. municipality). This paper describes the structure and contents of both the course and the exam, and discusses shared experiences.

ABOUT THE AUTHORS

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INTRODUCTION

Technological developments have resulted in more sophisticated and complex systems in which humans have to operate. These systems are characterized by a highly dynamic and sometimes hostile environment, the variation of (often conflicting) goals, the incompleteness, uncertainty and ambiguity of information, and the involvement of teams of officers with members having different roles and responsibilities (Rouse, Cannon-Bowers & Salas, 1992). In these situations, many tasks are conducted by multi-disciplinary teams. Emergency management teams are characterized by these descriptions. Because emergency management teams have to operate in critical situations affecting the life and well-being of many citizens (see e.g. Figure 1), it is important that these teams can perform their tasks in a competent way. Team performance is affected by many different variables, both within the team itself and in the organizational and operational context. Therefore, training cannot be the sole contributor to enhance team effectiveness. But carefully identifying and analyzing the variables affecting team performance, and taking into account these factors in the process of instructional systems design, will probably positively impact the effectiveness of the team training (Van Berlo, 2005; Van Berlo, Lowyck & Schaafstal, 2007).

Training of multi-disciplinary emergency management teams is becoming a more common practice. Nevertheless, the value of these trainings and exercises is questionable. Scenarios are quite often realistic and challenging to the trainees: the team members are heavily engaged in doing their jobs in a multi-disciplinary context. But the degree to which they can really learn from these experiences depends on more than just the realism: the training situation may be too complex or hectic to get a good understanding of the team's performance. A solid evaluation afterwards is therefore of utmost importance.

Figure 1. Complex emergencies require multi-disciplinary teams

However, an effective evaluation requires evaluation experts. In many cases evaluators are themselves experts in the field of emergency management. But that does not automatically guarantee them to be expert-evaluators. They need to be able to not only observe and diagnose the team's performance (with respect to task-work and teamwork), but also to give feedback in an effective and structured way, and to guide the team in their evaluation process. Improving the competencies of evaluators is therefore conditional for increasing the effectiveness of multi-disciplinary exercises from a learning perspective. Supported by the Dutch Home Office, a six-day course and an interactive exam were developed combining practical experience and the results of scientific research. This paper describes the structure and contents of both the course and the examination, and the experience gained to date. First, the theory behind multi-disciplinary team training is briefly explained. The following two sections describe the structure and contents of both the course and the exam. Next the findings so far are described followed by a concluding discussion.

THEORY AND METHOD

It becomes increasingly clear that just putting together a team of individual experts does not make an expert team (Salas, Cannon-Bowers, & Johnston, 1997). In recent years, it has been shown that a good approach to training teams with complex training technology is linking training goals to events in training scenarios in a controlled fashion. This is called the 'event-based approach to training' (EBAT: see Figure 2) (Hall, Dwyer, Cannon-Bowers, Salas & Volpe, 1993; Cannon-Bowers, Burns, Salas & Pruitt, 1998).

The EBAT framework starts at the top left hand side with the tasks to be performed by the team. The basic assumption is that training should provide opportunities for practice, enabling a team to develop critical competencies to conduct their mission or to manage an emergency. The team and individual behavior indicating these competencies is explicitly described in the learning objectives. Based on these learning objectives, the training scenario is developed. A training scenario consists of several events that are specifically designed to trigger the team members' behavior as described in the learning objectives. Events are critical incidents that can occur during the course of the emergency and on which the team is supposed to react. For every event, the observers know what behavior the team should demonstrate, and what prototypical mistakes could be made. This facilitates a systematic observation of the team members' behavior. Based on these measurements the training staff is able to make a valid diagnosis of the performance and to assess to what extent the learning objectives have been achieved. During the debrief feedback is provided to the team and, together with the team, the lessons learned are formulated. The strength of EBAT is the systematic linkage among these components. Without this linkage it is impossible to ensure that team members will have learned anything from the training.

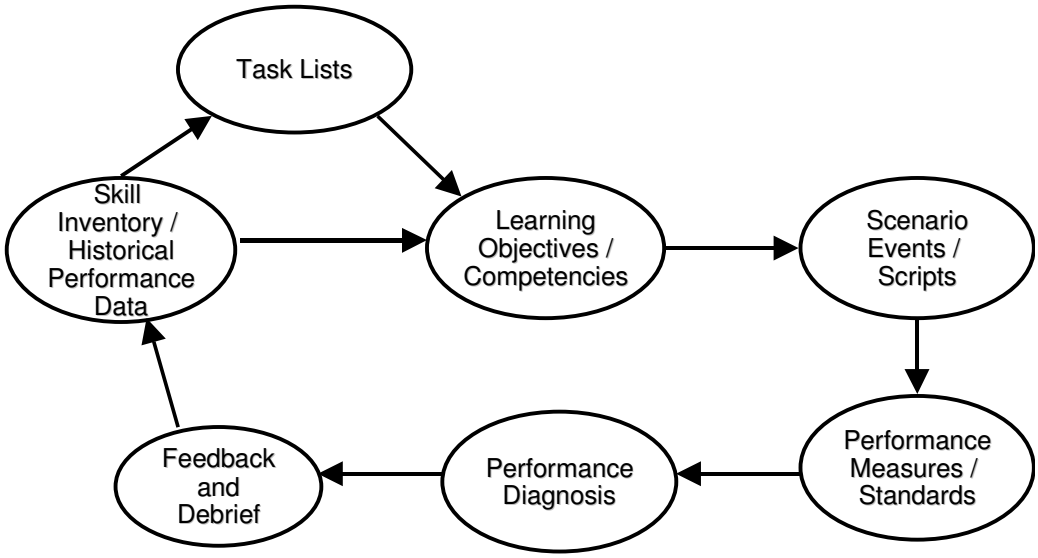

Figure 2. The EBAT framework (cf. Cannon-Bowers, Burns, Salas & Pruitt, 1998, p. 366)

Performance measurement, diagnosis and providing feedback are essential elements to support the learning process the team needs to be engaged in. Although technology can be supportive in this respect, the competence of the human evaluator is critical. Guided by the instructor the team members reflect on the team's performance, discuss which actions have been conducted, why certain choices and decisions have been made and which improvements can be made. In this way, a critical function in the team's learning process can be realized: reflecting on their own behavior in order to gain a deeper understanding of the characteristics of effective team performance. The reflection is primarily aimed at the instructional objectives and the execution of the training scenario (Van Berlo, 2005).

In this project, four key players in The Netherlands teamed up: the Police Academy of the Netherlands, the Netherlands Institute for Physical Security, the Institute for Safety, Security and Crisis Management (COT), and TNO Defense, Security and Safety (TNO: the Netherlands Organization for Applied Scientific Research). The partners in our project team have

various backgrounds, covering the fields of operational emergency management, instructional design, organizing and evaluating exercises, and research on real-life crises and team training. Based on gained practical and theoretical experience, the competencies expert evaluators need to have were defined. As a prerequisite, the evaluators need to have basic knowledge of the structures and processes within multi-disciplinary emergency management organizations. They also need to be able to observe multi-disciplinary teams, and diagnose their processes and performance. Based on the observations and diagnosis, they should give feedback to the group in two ways: a) directly to the team during a guided discussion, and b) afterwards in a written report. The evaluator must be able to handle resistance from the team and give the feedback in a respectful manner. The following sections describe the structure and contents of both the course and the exam.

STRUCTURE AND CONTENTS OF THE COURSE

Supported by the Dutch Home Office, and with the Police academy of the Netherlands as project manager, a six-day course was developed. In three blocks of two days, including an evening program, the trainees learn more about observing multi-disciplinary team performance, conducting an evaluation with the team, and writing an evaluation report. Hands-on experience is combined with short theoretical reflections. One or two core instructors are responsible for most of the lectures and exercises; guest-instructors and role-players are scheduled on more specialized topics.

The four building blocks, upon which the course is based, are 'observe', 'evaluate', 'write evaluation report' and 'attitude' (see Figure 3). These are the four pillars that form the base that good evaluators need. All the competencies or knowledge that the trainees need to acquire, are placed within one of these blocks.

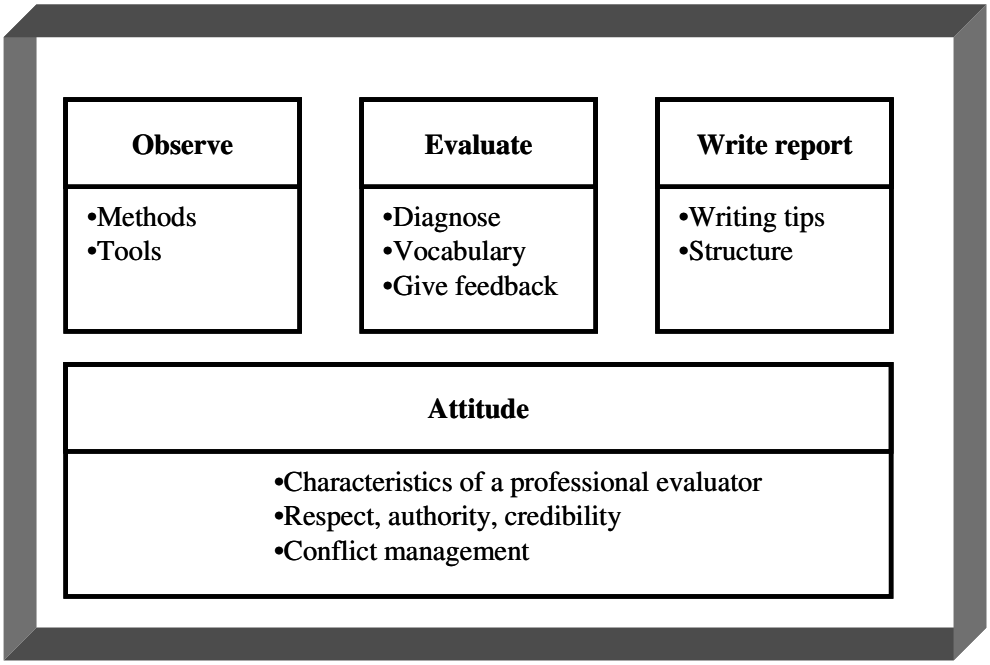

Figure 3. Structure of the course on learning to evaluate multi-disciplinary teams

In the block 'Observe', the theoretical topics of human biases in observations are treated, as well as non-verbal communication and group dynamics, e.g. team roles (Belbin, 1996), and influence techniques (Forsyth, 2006). Tips and tricks are shared in making observation notes and trainees practice frequently with observing different situations. In the block 'Evaluate' trainees learn the basic rules of giving and receiving feedback, and human interaction processes (Remmerswaal, 2003; van Dijk, 2000). Attention is paid to personal styles and how to handle conflicts within teams. The trainees practice frequently with different feedback situations.

In the block 'Write report' the focus shifts to writing an evaluation report: what is a good way to describe the entire performance of a multi-disciplinary emergency management team in a report and how does this relate to the training objectives? And how does one come to a conclusion in a logical and understandable manner? The so-called OAOA-method (a Dutch acronym for Observe-Analyze-Judge-Recommend) has found to be helpful in this respect. The blocks described so far reflect three key competencies of an evaluator. A prerequisite however, is a professional attitude of the multi-disciplinary evaluator. This relates to the way the evaluator sees his own role in the whole process of improving the performance of emergency management teams during training and exercises. The multi-disciplinary factor requires them to gain knowledge about all relevant organizations. And last but certainly not least, the importance of respect, authority and credibility is stressed.

In the course, these four blocks were integrated by combining theoretical blocks with frequent practices. For instance, at the start of the course trainees practice their observation and writing skills based on DVD-recorded team actions. Trainees engage in role-playing situations, both with fellow trainees and professional role players, and practice feedback skills (see Figure 4). At the end of the course, trainees observe a real-life exercise of the Dutch police force or the military, giving them an opportunity to practice in a realistic operational setting.

Figure 4. Videotaping role-playing exercises

Trainees bring in a variety of operational expertise, cultural differences, and training experiences. For instance, the police evaluates real-life large-scale operations with specific evaluation teams, but gives the feedback only to the overall commander. The fire brigade particularly has experience in evaluating training and exercises. The military has, in general, a more formalized way of conducting evaluations mainly focused on procedures. In order to promote gaining knowledge about other disciplines in the emergency-management organizations, several group activities and an evening program are included in the course. This gives trainees (also informal) opportunities to exchange knowledge and expertise, learn from each other's difficulties, and get a better understanding of each roles and positions. Combined with the fact that the core-instructors guide and coach the trainees, a safe learning environment is established.

STRUCTURE AND CONTENTS OF THE EXAM

After the course a competence test takes place. A competence test is an instrument with which trainees can demonstrate the acquired competencies and is a standard way of concluding a course at the Dutch Police academy. Proven competence results in a formal qualification. The trainee has to perform successfully during his assignment in order to be qualified in his day-to-day practice. Competence tests are developed and determined by a development group, consisting of faculty teachers, operational experts and specialists, and a developer of competence tests from the Examination Board of the Police Academy. This development group determines the content and form of the test. A competence test contains one (or more) assignment(s), which is (are) described and provided with assessment forms (checklist) and explanatory notes.

According to the Examination Board, a valid competence test must be competence-based and as realistic as possible. That is why the development group often chooses a work sample test to assess the competences of the student. In this case, however, this was not possible because the expert-evaluators can only do their activities when qualified. Therefore, a simulation was developed in order to assess the trainees. A competence test must also be reliable. This means the assignment needs to be standardized. For this purpose, several scripted scenarios were used for the simulation. These scenarios describe the interaction within a multi-disciplinary emergency management team and are played by professional role players. The performance of this team is recorded on DVD.

Currently there are two different scenarios that can be used during the exam. The first scenario deals with a flooding and the second scenario with a chemical railway accident. Figure 5 shows a screen capture of the first scenario.

Figure 5. Screen-dump of the flooding exam scenario

During the exam, the trainee watches the DVD, observes the team (as if he/she was present at the exercise) and prepares for the feedback session. He/She is then taken to a separate room in which the particular team members (the same role-players as on the DVD) are ready for the actual feedback session. In this 20 minutes interactive session, the trainee gives the feedback to the team members who play their scripted roles. Finally, the trainee writes the evaluation report.

Two independent assessors observe and assess the trainee's performance. The assessors are observation and evaluation specialists, do not teach during the course, and are trained in assessing trainees following the regulations of the Examination Board. They use a standardized assessment form with several criteria (see Table 1). The trainee passes the competence test when he/she scores positively on all four crucial criteria and at least two of the non-crucial.

Table 1. Format of the assessment form

1.	**Conducting the evaluation**	
1.1	Give effective and constructive feedback	Crucial
1.2	Reflect on contents of teams' performance	Crucial
1.3	Actively involve the team in the evaluation	Crucial
1.4	Authority	
1.5	Credibility	
1.6	Respect	
2.	**Writing the evaluation report**	
2.1	Content	Crucial
2.2	Structure	

The quality of 'conducting the evaluation' is assessed immediately after the trainee has finished the feedback session. The assessors consult the role-players to get a better understanding of how they have perceived the students' performance. On a later moment, the same assessors evaluate the report. When student pass their assignment, they receive their certificate from the Examination Board of the Police-academy.

FINDINGS

Empirical validation of training interventions is an essential step. Empirical research is needed in order to formulate theoretically sound and validated design specifications. Because of the practical nature of Instructional Design research, this research should have ecological validity (Elen, 1995). This ecological validity is achieved, as much as possible, in a naturalistic environment and by conducting design experiments. A design experiment focuses on engineering innovative educational environments and simultaneously conducting experimental studies of those innovations (Brown, 1992). It is an empirical study in which instructional support is designed, implemented, validated and revised in an iterative, recurrent way (Brown, 1992; De Corte, 2000). This process was followed during the cycle of six courses so far.

After every block of two days, there was plenty of opportunity for trainees and teachers to reflect on contents and structure of the course. After the last day, they all engaged in an interactive evaluation discussion. The topics of the course, the relations between the topics, the intensity of the course, the quality of the teachers, the homework, the exercises and role plays: everything has been discussed in an open atmosphere with the intention to improve the course's quality. After all exams of a course, the assessors and role-players have a good picture to which extent the trainees master the competencies. These experiences are fed back to the core instructors who determine, together with the other teachers, how these experiences relate to the objectives and contents of the course. In this way it was continuously checked how the trainees could be helped in achieving the training objectives and improve the quality of the course while at the same time maintaining the high quality standards of the exam.

All trainees indicated the course as 'very intense'. An explanation is that the focus of the course is not only the topic 'evaluation' or the roles of other disciplines and emergency organizations, but also the attitude of the trainee. Conducting many practical exercises and receiving and giving personal feedback have been perceived of as useful learning moments. A safe learning environment is therefore of paramount importance. Making mistakes was accepted, discussions were respectful, and everybody was keen on helping the others in improving their competencies. In the periods between the course blocks, trainees indicated that they practice what they have learned. This was not only related to their tasks as evaluators during exercises, but also to other tasks like for instance evaluating real-life incidents and personnel management. The exam, with professional role-players, is perceived of as realistic, dynamic and difficult. Trainees have the experience of giving feedback to a real operational emergency management team and that you really have to earn the certificate. That is reflected in the percentage of trainees that eventually pass the exam: so far, about 35% of the trainees do not pass the exam the first time.

Everyone appreciated the various disciplinary backgrounds of the trainees. This stimulated a multi-disciplinary view on emergency management and that is of course essential for evaluating multi-disciplinary teams.
Finally, the organizations the trainees come from are satisfied with their more competent evaluators. The selection procedure, the high quality standards and the relatively low success rate at the exams, are the talk of the town. Nevertheless, potential trainees are eager to participate and the managers are willing to send more trainees.

DISCUSSION

This paper described the structure and contents of both the course and the examination, and shared experiences were discussed. Up to now, the course has been conducted six times over the last two years. Each time the course was evaluated, forming the basis for the next course's improvement. It is, at least in The Netherlands, one of the first courses specifically aimed at learning to evaluate multi-disciplinary emergency management teams. Besides, the target group itself has a multi-disciplinary background as well: trainees come from first responder organizations, the military and other organizations such as the municipality.

Following the success of this course, the Dutch Home Office has established a national pool of evaluators for emergency management exercises. Mandatory for entering this pool is passing the exam of our course. The pool is coordinated by the Police academy of the Netherlands and called upon on a regular basis, especially in case of large exercises involving organizations from different counties/states, critical infrastructure and/or different nationalities. Also during the largest national crisis management exercise in the Netherlands so far (Voyager in 2007) many evaluators from this pool were involved.

More and more emergency management organizations are getting convinced that professional and certified evaluators really have an added value: already over one hundred calls for participation in the course were received. In this way it would be possible to have several evaluators in every single newly formed safety regions in the Netherlands. Having a national pool of professional evaluators can also stimulate the regions and its organizations to organize and conduct multi-disciplinary trainings and exercises. It is a guarantee that you will have a solid evaluation afterwards, increasing the degree to which teams can really learn from these exercises.

Conducting evaluations is a profession in its own. The course alone is just one step in creating a more professional community of evaluators. Expanding the knowledge base and increasing the competency level of the evaluators is a continuous effort. This can be facilitated by practical experiences as evaluators, but also by critically reflecting upon your own behavior as an evaluator, together with peers. These group reflection sessions are now organized and the evaluators' experiences are integrated into the next courses.

Not only the former trainees, but also the assessors need to reflect on, update and maintain their expertise. A senior assessor has been appointed to continuously check the quality of the exam and to train and coach new assessors. Group sessions with assessors are organized and, at least once a year, a joint session with assessors, instructors, developers and role-players to share experiences and look for opportunities to improve the course.

This course gives a good and firm basis for evaluating multi-disciplinary teams in the emergency management organization. Nevertheless, the emergency management system in The Netherlands is still a complex system, consisting of many different organizations at various levels: operational, tactical and strategic, as well as

local, regional, national and international. Besides the more general competencies as trained in this course, other competencies may be required for conducting evaluations at specific (combinations of) levels. One example is setting up and leading a large, multi-disciplinary evaluation team. Another example is the design of training scenarios taking the performance measurement into account as an integral part of the exercise development. Together with the Dutch Home Office, these competencies will be defined and it will be determined if these need to be integrated within the existing course or that additional courses need to be developed.

Large emergency management exercises often involve many teams that are distributed in the area. As the teams and team members are not physically on the same location, performance measurement and providing feedback can be problematic. In order to give adequate feedback, it is essential that observers, who are distributed themselves as well, can quickly compare and integrate their observations. In this way, the time needed to prepare the evaluation session can be reduced to a minimum. The sooner the results of an exercise can be evaluated, the better it is. For this reason, a group of former trainees has experimented with a mobile performance measurement and evaluation tool, specifically developed for distributed team training (Van Berlo, Hiemstra & Hoekstra, 2003). This tool on a tablet-pc (MOPED) helps the evaluators in observing team performance and in quickly generating, sending, and receiving data to support the evaluation. Given the rapid technological developments, expectations are that during emergency management training and exercises evaluators will use these tools ever more frequently. It is therefore important to get a clear picture of how the training staff should be supported in doing this, how this affects the competencies of evaluators and how they can best be prepared for this.

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