Remote Training for Firefighter Group Commanders

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Abstract. This paper describes the results of a project funded by the Austrian government that has set a starting point for the digitalisation of the Austrian fire brigade training. Within the scope of this project, the theoretical contents of the group commander training were transferred to an online learning platform (Moodle). This has led to the great advantage that the trainees are not absent from their workplace for an entire week, but only two to three days. In addition, the time gained can be used to offer the important practical training more intensively and in better quality. A Moodle course was set up to teach the theoretical content in advance of the shortened but more intensive practical training. At the end of the course, an exam is held which is the entitlement for the practical part. The participants receive a certificate which is automatically generated by the learning platform.

Additionally, Citizen Science methods were used to ensure the quality of the online education. Approximately one hundred people were interviewed on the design of the course, including participants, future participants, teachers at the fire brigade academy, and citizens affected by firefighting operations. For this purpose, teaching content and videos of courses held were made available on a public web platform. The results were used to further improve the course and increase its quality.

Keywords: Firefighter training · Distant education · Citizen science

1 Introduction

The Austrian fire brigades are on the threshold of digitalisation. The regional fire brigade academies are in the process of transferring teaching and learning content to online platforms in order to be able to offer modern and up-to-date training in the future. In addition to members of the professional fire brigades, training is provided above all for members of the voluntary fire brigades who have a main occupation [1] and therefore must spend additional time on these training courses. For example, training to become a group commander currently...
requires that participants are not available to their main employer for a whole week.

The main objective of this project (it was named GriSu, after a cartoon dragon created in Italy [2]; see Fig. 1) was to facilitate access to training, especially for volunteer firefighters. Moreover, by bringing forward the theoretical training online, the practical training should be more intensive and of better quality. The project should start with the group commander course, which usually keeps volunteer firefighters away from their main job for a whole week, but with on-line training, the attendance times should be halved.

Education in this form is an absolute novelty in Austrian fire brigade training. Starting in our province of Carinthia and with the group commander course, the interactive online training will be extended to the rest of Austria as well as other courses.

Fig. 1. Grisu, the firefighting dragon [2].

2 Implementation

The developed online course has an interactive structure. Intermediate checks ensure that content that has already been heard or read is also understood. Only after a positive intermediate check will further content be released.

The course contents are offered in the following formats:

2.1 Multiple-Choice Questions

This question type is mainly used for the check of text-based content, such as law and organisation topics. An example (translated) is:

Which terms are covered (for example) by the fire brigade’s task of preventing “other dangers of a local nature”?

Select one or more answers:
- Flooding
- Vehicular accident involving trapped passengers
- Fire prevention
- Earthquake
2.2 Scenarios

Figure 2 shows a tactical example scenario. The (translated) assignment is as follows (TLFA2000 is the name for a special fire brigade unit [3]):

**Fig. 2.** Tactical example.

*General situation: office building on the outskirts of the city, surface hydrant (sufficient water) in approx. 80 m distance, 2.00 pm, little to no traffic. Own situation: TLFA2000 (1:6) incl. breathing apparatus, further forces are on their way. Damage situation: room fire on the ground floor, probably several people in the building (it could not be confirmed that nobody is in the building!), intensive fire (see picture). What actions (note: max. 4 actions due to team size) do you take with the TLFA2000?*

2.3 Videos

Two video types were recorded and made available to the participants:

- Recordings of demonstrations in front of an audience (of a previous course, see Fig. 3);
- Teaching content in a studio atmosphere, without any audience (Fig. 4).

The efficiency of the two video types was tested by interviewing some of the participants. Both types have their advantages and disadvantages: The “studio videos” convey the content in a clear and structured way, whereas the other videos are perceived more vividly when the audience is involved.
Again, the learning flow is interactive. For example, if a set of videos describes the fire classes A to D (solids, liquids, gases, and metals), the video is stopped after the description of fire class A and the knowledge of the trainee is tested with quiz questions. Trainees can answer the questions as often as they want; only after correct answers the next part (fire class B) is activated.
2.4 Calculation Exercises

Additionally, calculation exercises need to be completed by the trainees. Figure 5 shows an example, where the resulting force absorbed by the fire truck needs to be calculated. The (translated) assignment provided together with the graphic is:

An accident vehicle (see figure) must be secured with force \( F \). The constellation of loose and/or fixed rollers can be seen in the figure. What force must be absorbed by the winch of the fire truck?

![Accident vehicle with forces](image)

**Fig. 5.** Calculation exercise: force on a fire truck.

2.5 Final Exam

Participation in the final examination is activated at a previously defined time and can be taken online. The exam content consists of a selection of questions that have already been answered during the interactive course. In contrast to the previous procedure, there is only one possibility to answer the questions.

After passing the final examination, participants receive a certificate. This certificate entitles them to participate in the practical training, which can now be more intensive due to the time saved by the online course.

3 First Results

In order to implement the e-Learning product and further on to transfer the new concept, the Carinthian State Firefighting school started an evaluation phase in April 2020 with 20 firefighters, which were selected by parameters such as age, gender, experience and duty-time in the fire brigade. Those candidates were
given the task to work through all the phases of the digitalized part of the group commander curriculum, do the intermediate checks and maintain their progress until the final exam. The participants had the possibility to deliver feedback by an internet platform, which was directly evaluated by the firefighting school in order to fix problems and/or to improve the contents in general. Additionally, the participants were guided by the trainers of the firefighting school using the communication possibilities of the Moodle platform. Finally, an all-hands meeting with the participants and the involved trainers will lead to the first released version.

Due to the Covid-19 crisis, all presence courses had to be cancelled until autumn; which means, that also the planned presence part (3 days) of the “Firefighting Group Commanders” course had to be transferred to September. The participants of the evaluation are now been led to this part and will be finishing the whole education with the final exam in presence by the end of September.

Until now, the concept has surpassed the expected results as the participants have expressed a very positive view to the new technology. Moreover, the trainers of the firefighting school improved themselves and developed a new concept to design courses using the “inverted classroom” concept. In the meantime new learning-products, for instance in the segment of disaster release relief, were developed on this basis.

4 Citizen Science Approach

To ensure the quality of the online education Citizen Science methods [4–6] in combination with tools of qualitative and quantitative empirical social research were used. On the one hand, the fire brigade was interested to find out from people who needed a fire brigade intervention in the last three months (January to March 2019) whether there were still points regarding the implementation and the procedure that should be considered even more in the training of fire fighters in the future. To this end, an online survey was carried out with 100 people from the target group in Carinthia and eleven people personally affected were interviewed.

67% of the survey participants, of which 58% were male and 42% female, were in need of a firefighting mission for the first time. The most common type of mission was a fire, followed by vehicle recovery, water damage and a traffic accident. Most people in this situation were excited (29%) and at the same time grateful (35%) for the help they received. The most stressed factor for the respondents was their own awkwardness (41%). The most important aspects for a good firefighting operation are, from the point of view of the affected persons, the immediate readiness for action, the professional and quick handling as well as the friendly support and information on site (see Fig. 6).

All respondents rated the fire brigade team after the experienced mission as professional, experienced, friendly, reassuring, well-organised, competent and sufficiently trained. The personal interviews also confirmed the thoroughly positive image of the fire brigade, which was confirmed by the deployment in the
personal environment of the persons concerned (quick appearance, good equipment, helpfulness, professional and calm action). In the areas of professionalism and personal crisis management, the expectations of the persons concerned were exceeded.

All respondents were also asked for their opinion on the planned, additionally offered combination course (online and presence). They were also presented with a sample instructional video in order to obtain their assessment of its quality and comprehensibility. The presented instructional video was rated by the oral and digital interviewees as instructive as well as very good in terms of quality and comprehensibility. During the personal interviews, the importance of group work, the possibility to ask questions and the time of presence was emphasized. This was therefore given particular attention in the design of the combination course. All participants in the survey are of the opinion that there should be more training or information opportunities for citizens and pupils (see Fig. 7).

Fig. 6. Question about the professionalism of a fire brigade mission.

The eleven oral interviews led to further results. It was mentioned several times that it is becoming more and more difficult to get enough firefighters for an operation in the countryside, especially during the week. There is a fear of reduced budgets and insufficient funding. As a result, not all fire brigades in a county are getting all the equipment they need. Many companies no longer

Fig. 7. Question on information opportunities for citizens and pupils.
release firefighters, which makes it impossible for many to get involved. The Citizens Science survey also included two group discussions with seven former course participants, four guideline-based interviews with instructors and a survey of all instructors at the Carinthian State Firefighting School. All of them were asked about their experiences with the previous course design and about their opinion on the newly planned course preparation and the digital teaching and learning setting presented.

5 Conclusions and Outlook

Started in 2020, the group commander course will be conducted alternately in the online form and in the original form, so that the findings can be implemented, and the quality further improved. First evaluation results are expected in June 2020.

The next step in the cooperation between our university and the fire brigade academy school will be to also offer practical elements of training online or remote. As an example, a remote-controlled extinguishing system is planned, which will be set up as a remote laboratory [7].

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