

# Haakins: Cyber Security Training with Gamification

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## Abstract

With increased digitalization, our societies have become more vulnerable to cyber attacks, and we are already seeing both criminal groups and nation states being very active in the cyber domain. This calls for action in order to better protect our societies, companies and people against these attacks. One of the main challenges with respect to this is the lack of skilled people – a gap that is expected to increase in the coming years. To increase the interest in cyber security among young people, and to increase the competence level among young people, Aalborg University together with a number of partners have developed the training platform Haaukins. It can easily be setup by teachers, who can select which challenges the students will work on – a typical session would contain around 10 challenges out of the 180 currently provided. The students are then presented with these challenges along with a virtual lab, which provides a closed and secure environment for working with cyber security. Upon solving challenges, the students can gain points and compete with their classmates. The workshop provides an overview of the platform, and then takes the participants through a typical training session which require no previous experience with computers, programming, or cyber security. The session consists of a short introduction to the platform, followed by a mix of short presentations, demonstrations, and independent work on challenges. After the session, a discussion on how the platform can be integrated in learning activities is facilitated. A particular focus in the discussion is how more diversity among the students can be achieved.

**Keywords:** Active Learning; Gamification; Cyber Security; Engineering Education.

## 1 Introduction

With our societies becoming increasingly digitalised, we are also becoming more exposed and vulnerable to cyber-attacks. According to FBI's Internet Crime Complaint Center, 2021 gave new records both in terms of number of cases (847,376) and the total losses (\$ 6.9 billion). These numbers have been consistently increasing during the last years – in 2017, the total number of cases was 301,580, and the losses \$1.4 billion (FBI, 2021).

One of the main problems for companies and societies is the lack of cyber security professionals. According to the (ISC)2 2021 Cybersecurity Workforce Study (ISC2, 2021) there is – despite of many efforts across the global – a workforce gap of 2.72 million people.

One way to attract more young people into working with cyber security is to introduce cyber security at all levels in the educational system is to use cyber security training platforms, which can increase awareness by providing fun and interesting hands-on challenges – often with an element of gamification (Kjorveziroski et al., 2020). One such platform is the Haaukins platform developed by Aalborg University (Panum et al, 2019). Haaukins makes it possible for teachers to setup virtual labs in a highly automated fashion, and in a way that is easily accessible for both students and teachers as everything runs in a browser and no special software is required. The teacher simply selects the number of labs, the relevant challenges for that class – and then students can sign up and compete for points among other students in the same class. The gamification is supported by leader boards and scoreboards, so progression can be tracked by all participants throughout the session. However, as the uptake of Haaukins is increasing, and as more teachers with different backgrounds – sometimes with little experience with cyber security – it is becoming even more important that the system is not only technically user friendly, but also that the pedagogical approaches are clear, and that both teachers and students are supported by the platform together with other online resources (Menecozzi et al, 2021).

This pedagogical challenge is also the starting point for this hands-on workshop, where we will explore and discuss the use of Haaukins with an emphasis on good pedagogical practices.

## 2 Activities

The session is divided in two parts, each expected to last around 45 minutes.

The first part is a presentation of the Haaukins platform, where the participants also get the chance to solve challenges and, in this way, get a good understanding of how the platform works. Participation requires no previous experience with computers, programming, or cyber security. The first part contains the following elements:

- Presentation of the Haaukins platform (5 minutes)
- Demonstration and hands-on work on two challenges, organised like a typical training session with (1) introduction to the concept, (2) introduction to the challenge, (3) participants working two and two on the challenge, (4) demonstration of the solution. 20 minutes is allocated to each challenge.
- More challenges will be made available for the participants, so in case there are participants with domain knowledge, they can move faster, and all participants have the possibility to try out more challenges after the session.

The second part is a discussion session on how the platform can be integrated in learning facilities. The participants are divided into groups, where each group discuss one of the following topics:

- How to integrate hands-on training into cyber security teaching in the best way?
- How can hands-on training be integrated into cyber security teaching in a curriculum, in different programs with students from different backgrounds?
- How to enable the teachers to use the platform, given often limited time constraints?
- How can Haaukins be used in promoting more diversity among cyber security students, e.g. attracting more women to the field?

For the second part, the groups will have 30 minutes to discuss their topic, and then no more than 3 minutes per group to present the most interesting findings. The findings for each group will be documented in a Padlet.

The participants are requested to bring a laptop to be able to do the challenges, but no special software is required. The laptop will also be used for documenting the group discussions in the Padlet

## 3 Expected results

There are two main results of the workshop:

- The participants will be prepared to facilitate cyber security trainings using the Haaukins platform.
- We will generate ideas and knowledge about how to improve learning, teaching, and training within cyber security, including achieving more diversity and better gender balance in the field.

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