The future of cabin crew training: The role of artificial intelligence in the evolving aviation industry

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Abstract

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This thesis aims to find out the potential use of artificial intelligence (AI) in cabin crew new entrant training and how it can support the work of cabin crew instructors. The writer, working as a cabin crew member and a safety instructor, was inspired to research this topic after studying AI and recognizing it growing role in education and aviation. The aviation industry is evolving fast and the training methods must also adapt to the changes.

The goal of the research was to find out the routine tasks in trainings that could be supported by AI and how cabin crew instructors feel about using AI in the trainings. The study was done by combining theoretical review and a survey that was sent to cabin crew instructors in Finland. This survey brought insight for the attitudes and thoughts that the cabin crew instructors have. The survey was sent to 66 instructors and 33 responses were collected and analysed using qualitative and quantitative methods.

The first chapter introduced the background and the motivation for the thesis. The next chapter outlines the theoretical background on artificial intelligence and its use in aviation and other similar industries. The following chapter gives a detailed information about the cabin crew new entrant training, including the content, structure and regulatory framework. This is followed by a chapter that connects the theory and practice by going through the possible effects on training processes, learning and instructor's role. Finally, is the survey itself and the results are gone through and analysed.

The results from the theoretical review and the survey show that the instructors see artificial intelligence useful in areas like emergency equipment training and crew resource management, so particularly in topics where content and consistency are important. There were also several concerns raised, especially regarding the accuracy of AI-generated material, data privacy, the loss of human interactions and the risk of over-reliance on automation. The results of the survey show that overall, the instructors are open to the use of AI, if it is combined with human led training in a hybrid model.

Based on these answers and findings, in the end is recommendations for responsible implementation of AI tools for training facilities. These include proper instructor training, critical content review processes and clear boundaries with sensitive information. The conclusions highlight the importance of further research and development to make sure these AI tools can be trusted and used safely in the training environments.

Keywords
Artificial intelligence, aviation, training, cabin crew

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1 Introduction

This thesis “The future of cabin crew training: The role of artificial intelligence in the evolving aviation industry”, aims to see how artificial intelligence could be used to support cabin crew new entrant trainings. The focus is mostly on the role of the instructors and their views and ideas. The research questions of which routine tasks in cabin crew training could potentially be supported by the help of artificial intelligence, how cabin crew instructors feel about using artificial intelligence and how would the use of artificial intelligence affect the training itself, the learning or the role of the instructors, will be explored in this thesis.

The goal for this thesis is to explore the potential of artificial intelligence in cabin crew trainings and specially in the new entrant trainings. With the help of the survey gain understanding about the instructors’ opinions, ideas and concerns related to the use of artificial intelligence. Also to identify the areas where artificial intelligence could be most useful and based on these finding give recommendations for responsible artificial intelligence integration. The cabin crew training involves a large number of different kinds of trainings if it is recurrent training every year, type specific training after longer period of being away from flying, changing or adding aircraft types or then the new entrant training. In this thesis the new entrant training was selected as all instructors work with new entrant training, meaning safety, first aid and service. In some other training only safety or safety and first aid can be present. It was important to get all the instructors involved in the making of this thesis and explore all the possibilities. That is why the limitation of new entrant course was selected. Also going through all the possible trainings would have made the work very wide and the key factors could have been missed.

This topic is relevant as artificial intelligence technologies are developing quickly and are adopted in many different sectors of the aviation industry. These include operations, maintenance, customer service and in small parts training environments. Cabin crew training still relays mostly on traditional methods in trainings. The importance of this thesis is in the effort to examine if routine tasks in the trainings could be supported by AI to improve consistency, accessibility and learning. This work also shows the instructors perspective on AI and their important insight on the topic. As the industry is continuing to modernize, trainings need to adapt to new safety standards, sustainability goals and training methods. This thesis contributes to the development by offering insights from instructors, helping the airlines to understand where AI could be used responsibly and effectively.

The writer of this thesis is a cabin crew member and a safety instructor for cabin crew. This way the writer has a personal interest to the topic and is able to bring insight of own professional knowledge to the topic. The topic for this thesis was chosen after having courses on artificial

intelligence and after that having a deeper understanding on the possibilities of AI. The use of AI is becoming more and more increased and the possibilities are widening all the time. Aviation is also an industry where things change quickly and the information or regulations can change constantly. This thesis was written between the end of October 2024 and start of May 2025, with the regulations and information of that time.

Research questions	Theoretical framework chapters	Survey questions	Results chapter
1. Which routine tasks in cabin crew training could potentially be supported by the help of artificial intelligence?	2.4, 2.5, 2.6 3	6,9,11,12	6.1
2. How cabin crew instructors feel about using artificial intelligence?	4.1, 4.2	3,4,5,6,7,8	6.1
3. How the use of artificial intelligence affects the training itself, the learning or the role of the instructors?	2.7 4	6,7,8,9,11,12	6.1

Table 1. Overlay matrix

This thesis is first looking into how artificial intelligence is linked into aviation and how it is used in aviation and similar industries. Also, in this chapter the current and the future is investigated and seen how AI could be used in cabin crew training in theory. What is important to notice is the impact that the use of AI will have on cabin crew and the industry in whole. There is also considerations of the benefits and the challenges and risks going with the use of artificial intelligence. This section begins by explaining what AI is and showing some current applications in aviation, like predictive maintenance, air traffic management and personalized passenger services. The goal is to give the reader a clear understanding of how AI is already transforming different parts of the industry. Next is the in-detail chapter of the cabin crew new entrant course structure.

The second chapter is focusing on the cabin crew new entrant training and the regulatory side of it. There are sections of safety training, first aid training and service training. These are gone through in detail in the point of view of the regulations and the practical side of the training. This new entrant training contains the initial training that is a very regulatory based basic training for all

European union member states airlines and then the operator training that can vary a bit between different operators, meaning airlines.

Cabin crew new entrant courses are organized when new cabin crew members are joining an airline, and it is done in two parts. First part is the initial part where the trainees go through the basics on safety, security, first aid, dangerous goods and crew resource management training. These are giving the trainees the capability to understand their role in the complex world of aviation and help them to recognize and deal with any abnormal or emergency situations. After completing the initial part that includes test, assessments and drills, the trainees get their cabin crew attestations. The attestation is like a driver's license for the trainees that they are allowed to act as a cabin crew member. With the attestation the trainees could go to work with another EU airline and only go to that operators type course. After initial training starts the airlines or the operators type specific training that involves teaching the trainees all the specific procedures that the airline has and specific information about the types of aircrafts that the trainees are going to be operating.

The next chapter is going through that in the point of view of the instructors and the regulatory and ethical side of the use of AI. Part of the thesis is a survey that is done for cabin crew instructors in Finland and seeing their thoughts and ideas about the use of AI. After going through the survey is the part for the results. Lastly in the end of the thesis are the conclusions of the whole thesis and possible suggestions for future use of AI for the employing company of the writer.

Next chapter, the focus changes to the survey conducted among Finnish cabin crew instructors. The method used to design and distribute the survey is described, followed by a detailed analysis of the responses. This part of the thesis shows the instructors' opinions, concerns and ideas on how AI could or should be used in training programs. Their insights are important for understanding the practicalities of introducing AI-based tools in safety, service and first aid training. The results are gone through with numerical data and open-ended questions by thematic analysis.

After the survey findings are presented and analyzed, the thesis ends by summarizing the key takeaways and discussing how the findings support or challenge the earlier theoretical framework. Recommendations for the implementation for training facilities are offered, as well as suggestions for future research and development. In the end there is consideration of the writer's own thesis work and the success of the whole work.

Despite the increasing interest in AI, there is still small amount of research on how it could be used in cabin crew new entrant training, especially from the instructors' perspective. Most academic literature focuses on pilots or general aviation technology, not on cabin crew or trainings. Safety-critical fields also require special attention to accuracy, trust and regulations, that makes it even

more important to think about AI use carefully. This thesis aims to fill that gap by gathering thoughts and concerns directly from experienced cabin crew instructors. These findings will help to understand how AI could be introduced in a way that is useful, safe and accepted by the people who do the trainings.

2 The role of artificial intelligence in aviation and related fields

This chapter goes through Artificial Intelligence and its use in aviation today. In the modern aviation world AI is changing multiple different sectors of aviation. This is important for learning and understanding the opportunities that AI bring to aviation. With those learnings it is possible to integrate these points into training and have a better overall understanding of the use of AI in aviation today. How it is used now is showing what routine tasks can be done with the aid of AI. With these opportunities kept in mind these could be integrated into cabin crew training as useful tools and to help instructors to keep their focus on the most important things. To get better understanding of the opportunities and already in use technologies, there is a need to go through them in a more detailed way to be able to use these insights in the end of this thesis.

Artificial intelligence is transforming the aviation industry by influencing various parts such as flight operations, maintenance, air traffic control and customer service. One of the most significant applications of AI in aviation is predictive maintenance, that makes aircraft safety and operational efficiency better. AI-driven predictive maintenance systems analyze large amounts of sensor data from aircraft components to identify potential failures before they occur. By using machine learning algorithms, these systems lower the possibility for unexpected breakdowns, optimize maintenance schedules and extend the lifespan of aircraft parts, leading to cost savings and improved reliability. (Epstein & Buhovac 2014, 112.)

AI is also playing an increasingly critical role in air traffic management. Traditional air traffic control systems rely on human controllers to manage aircraft movements, but AI-powered systems can process large amounts of data in real time, predicting congestion and optimizing flight routes. (Graham, 2013, 87.) Machine learning models can anticipate delays, suggest alternative flight paths and enhance decision-making for controllers, leading to more efficient airspace management and reduced fuel consumption. As air travel demand continues to rise, increasing of the use of AI into air traffic control systems is becoming essential for maintaining safety and efficiency.

Another important application of AI in aviation is pilot assistance and automation. AI-driven autopilot systems have long been part of aviation, but recent advancements in deep learning and computer vision are enabling more advanced decision-making capabilities. (Cameron & Green 2019, 154). AI can help pilots by providing real-time recommendations based on weather conditions, traffic and aircraft performance. In addition, AI-powered systems are being developed to support single-pilot operations, where automation takes over specific tasks, reducing workload and enhancing situational awareness. But single pilot operations are still a long way to go with the regulations and general public’s trust.

Artificial Intelligence's impact is also present in customer service and passenger experience. Airlines are increasingly starting to use AI-powered chatbots and virtual assistants to handle inquiries, process bookings and provide real-time flight updates. (IATA 2021, 205.) These AI-driven solutions enhance customer engagement by offering personalized recommendations, like seat upgrades, meal preferences and travel itineraries. Additionally, AI is being used for facial recognition at airport security checkpoints, smoothing boarding processes and reducing wait times while ensuring security compliance. (European Commission 2020, 73.)

Urban Air Mobility (UAM) brings a huge innovative step for urban transport, involving the use of electric or autonomous vertical take-off and landing (VTOL) vehicles for passenger and cargo transport. Helping to lessen traffic congestion UAM offers many different kinds of commercial applications and potential revenue streams across many industries, like logistics, tourism, emergency response and passenger transport. (Smith, Patel & Anderson 2023.)

One of the main commercial possibilities of UAM is in urban passenger transport. UAM could change urban commuting by offering faster and more efficient transportation options in densely populated cities. Companies like Joby Aviation and Archer are developing eVTOL aircraft with the potential for intra-city flight services. (Archer 2024.) The ability to skip traffic jams makes UAM a great solution for commuters and business travelers, especially in metropolitan areas with high traffic. The environmental impact is minimized with electric propulsion systems. (Deloitte 2021.)

UAM also has strong potential in changing logistics specifically in last-mile delivery services. UAM vehicles can reduce delivery times and costs by skipping road infrastructure and by that providing a competitive advantage in e-commerce. (PWC 2021, 10.)

2.1 Customer service

AI chatbots and virtual assistants help to enhance customer service and addressing passenger inquiries and aid passengers in getting personalized travel experiences.

Artificial intelligence is changing airline customer service by enhancing efficiency, personalization and overall passenger experience. One of the most noticeable AI applications in customer service is the use of chatbots and virtual assistants to handle customers questions and bookings. AI-powered chatbots provide 24/7 support, answering frequently asked questions, assisting with itinerary changes and even processing refunds. (IATA 2021, 178.) These virtual assistants use natural language processing (NLP) to understand customers questions, reducing the need for human intervention and lowering response times.

Another important AI-driven innovation in customer service is personalized travel recommendations. Airlines use machine learning algorithms for their benefit to analyze customer preferences, travel history and real-time data to offer tailored suggestions, like seat upgrades, hotel bookings and loyalty program rewards. By integrating AI with customer relationship management systems, airlines can deliver customized promotions, increasing customer satisfaction and revenue. (Cameron & Green 2019, 223.)

Facial recognition technology, another AI-based technology, is streamlining the passenger experience at airports. AI-powered biometric systems make check-ins faster, security screenings smoother and boarding processes efficient while also reducing wait times and enhancing security. (European Commission 2020, 84.) Some airlines have started to use AI-based self-boarding gates, allowing passengers to verify their identity without showing physical documents.

AI is also improving customer service through sentiment analysis, where machine learning models analyze social media posts, customer feedback and call center interactions to measure passenger sentiment. By identifying common complaints or dissatisfaction trends, airlines can proactively address issues and improve service quality. This technology helps airlines to respond quickly to negative customer feedback and enhance customer engagement.

AI is being used to predict and manage flight disruptions. By analyzing weather patterns, air traffic data and historical flight performance, AI models can anticipate delays and recommend alternative solutions for affected passengers. Advanced neural network models are used to improve airline disruption management to act more efficiently to unexpected changes. (NASA 2023.)

Some airlines use AI-powered notification systems to automatically inform travelers of changes and provide rebooking options, reducing frustration and improving service reliability. In-flight customer service is also benefiting from AI. AI-powered recommendation systems assist flight attendants by providing real-time insights into passenger preferences, giving the possibility for personalized service, like meal choices or special requests. (Epstein & Buhovac 2014, 98.) AI-based language translation tools further enhance communication between passengers and crew members, especially on international flights.

Despite the advantages, AI in airline customer service presents challenges, like data privacy concerns and the need for ethical AI use. Ensuring that AI systems are transparent, secure and compliant with regulations remains crucial for widespread adoption. Nevertheless, AI continues to change airline customer service, making travel experiences more efficient, convenient and personalized.

2.2 The use of AI in airline operations

Artificial intelligence is revolutionizing the airline industry, enhancing operational efficiency, customer experiences and sustainability initiatives. One focus area of AI application is in predictive maintenance, in which AI-driven systems monitor aircrafts performance levels and condition, and anticipate maintenance needs based on the information, this way reducing delays. For example, Boeing's Airplane Health Management system uses AI to forecast maintenance requirements and that way improving aircraft reliability. (AI Magazine 2024.)

Artificial intelligence is also making customer interactions easier through virtual assistants and chatbots that provide 24/7 support for bookings and questions. Airlines such as KLM and Delta use AI to offer personalized services, including tailored in-flight entertainment recommendations, improving the overall customer satisfaction. Multilingual support has been bettered with AI-driven voice-cloning technology. Pegasus Airlines has introduced an AI-powered in-flight announcement system capable of delivering messages in multiple languages, this way increasing inclusivity for passengers. (AI Magazine 2024.)

AI's role in predictive analytics could change aircraft maintenance for the better, lot like in healthcare diagnostics. By analyzing historical and real-time data, AI could help to predict potential failures and schedule maintenance proactively and with those minimizing operational disruptions. (European Commission 2021, 43.)

Artificial intelligence is revolutionizing airline operations and maintenance by improving efficiency, safety and cost-effectiveness. One of the most impactful AI applications in airline operations is predictive maintenance. By using machine learning algorithms to analyze sensor data from aircraft components, AI can detect early signs of problems and predict potential failures before they occur. (Epstein & Buhovac 2014, 112.) This approach reduces unscheduled maintenance needs, prevents expensive breakdowns and enhances aircraft reliability, improving overall operational efficiency.

AI is also optimizing flight scheduling and disruption management. Airlines use AI-driven systems to analyze weather patterns, passenger amounts and airport congestion to create more efficient flight schedules. These systems dynamically adjust schedules in real time, minimizing delays and maximizing fleet usage. When disruptions happen, these models assess multiple re-routing options, giving airlines the possibility to recover from delays faster and reduce passenger inconvenience. (IATA 2021, 189.)

In fuel management, AI is helping airlines to optimize fuel consumption and reduce emissions. Machine learning algorithms analyze flight data from the past, real-time weather and aircraft performance metrics to recommend optimal fuel loads and flight routes. By that improving fuel efficiency, AI supports sustainability efforts while lowering operational costs. AI-powered automation is also changing ground operations. Autonomous baggage handling systems, robotic aircraft inspections and AI-driven resource allocation tools help to make airport logistics more smooth. AI computer vision systems can detect structural defects in aircraft quicker and more accurately than human inspectors, reducing maintenance turnaround times and improving safety. (European Commission 2020, 92.)

In crew management, AI helps airlines optimize staffing levels, duty rosters and training schedules. AI-driven employee planning tools analyze historical data and operational needs to predict crew availability and optimize duties. This way also leading to better rostering of crew members and better work-life balance for crew members. This is also aiding in absence monitoring and seeing patterns in crew rostering and absence levels. (Cameron & Green 2019, 215.) These systems reduce crew fatigue, improve compliance with regulatory requirements and enhance operational efficiency.

Airlines are integrating artificial intelligence into their strategic leadership. International Airlines Group (IAG) has appointed a Chief AI Scientist to lead its AI strategy. They are focusing on the development of scalable AI solutions that enhance customer experience, operational efficiency and sustainability. These AI-driven initiatives demonstrate the significant impact of artificial intelligence on improving various aspects of the airline industry, from operational reliability and customer service to environmental responsibility. (AI Magazine 2024.)

Artificial intelligences use is spreading into air traffic control also. In the ATC towers there are many things to keep an eye on at the same time and some older programs have multiple repetitive tasks. AI can aid in lowering the need for repetitive tasks and free up some memory or focus for relevant things. In some airports, such as Heathrow, AI-powered systems like AIMEE (AI-Mediated Efficiency Enhancer) assist air traffic controllers in reducing delays and improving operational performance by adjusting flight paths. It uses advanced machine learning and data analytics to predict and manage air traffic in real-time, making smoother operations even in congested airspaces. AIMEE helps air traffic controllers make faster and more informed decisions by providing them with real-time information and predictive analytics. It processes large volumes of data like weather conditions, flight schedules, air traffic congestion and runway capacity and adjusts flight paths and optimize the flow of aircraft. This is particularly beneficial in high-traffic areas where managing congestion is critical. (EURONEWS, 2024.)

Another big advantage of AI is its potential to optimize airspace management. AI can help adjust air traffic routes and schedules based on real-time data, that reduces delays, enhances the efficiency of airspace use and leads to cost savings for airlines. AI systems like those developed by EUROCONTROL aim to give predictive analytics for air traffic management, ensuring that airspace is used optimally. AI can also lower the workload on human controllers by automating routine tasks and that way allowing them to focus on more complex and critical decision-making. (EUROCONTROL, 2024.)

The transition to AI-assisted ATC requires proper training for air traffic controllers. While AI can enhance decision-making, it is important that controllers understand how to interact with AI systems and interpret the data they provide. Controllers must also have the ability to make independent decisions in complex or unexpected situations, where human judgment is critical, like in emergency situations. (Cameron & Green 2019, 75-85.)

2.3 AI in other industries

Artificial intelligence has been a big force driving change in industries like healthcare and military. The current uses of AI in healthcare and military sectors applications could be used as well in aviation, especially in areas such as safety, training and operations. Many fields of work use checklist and are very safety critical fields. In these fields AI can help tremendously with lowering repetitive tasks and giving helpful data to human workers.

Artificial intelligence's role has grown a lot in healthcare with diagnostics, treatment planning and operational efficiency. Medical imaging is also one notable application in which algorithms analyze x-rays and MRIs with great accuracy. These are surpassing human radiologist with their accuracy. (Topol 2019, 72.) Topol (2019, 88) also highlights the human-AI partnership in which the doctors rely on AI for decision support while maintaining the full power of the situation. This model could be used in aviation by allowing pilots and maintenance teams to use AI for real-time analysis without giving away full control and by that balancing innovation with trust and accountability.

AI powered systems like IBMs Watson that is assisting doctors in coming up with personalized treatment plans by analyzing patient data and medical literature. AI-powered systems provide decision support by going through huge amounts of data, enabling medical professionals to make important decisions quickly based on data that they have. This concept could be used in real-time decision-making during flights. For example, AI could provide pilots with insights during emergencies by analyzing multiple data sources, like weather conditions, aircraft performance and traffic congestion. (Jiang, Jiang, Zhi, Dong, Li, Ma, Wang, Dong, Shen & Wang 2017, 123, 239.) In aviation, AI could revolutionize cabin crew and pilot training by tailoring programs to individual

needs. Adaptive learning platforms could assess a trainee's strengths and weaknesses, adjusting training packets accordingly to improve learning and efficiency.

Predictive analytics in healthcare also enables early detection of diseases and monitoring the patient outcomes. AI helps healthcare operations by optimizing resource allocation and workflow. For instance, AI-powered scheduling systems reduce wait times for patients while maximizing the use of staff and facilities. Similar efficiencies could be used in aviation, particularly in airport operations. AI could optimize gate assignments, crew scheduling and baggage handling, reducing delays and enhancing passenger experiences. (Reddy, Fox & Purohit 2020, 98, 125.)

These advancements in healthcare provide good ideas on how AI can contribute to aviation by enhancing the decision making in training and operational side. AI can identify problems with patients' health, so similarly algorithms could predict mechanical failures and potentially reduce delays and ensure passenger safety.

AI is widely used in military sector in surveillance, decision making and autonomous weaponry. AI driven drones and autonomous vehicles have enabled real time data collections and analysis. Autonomous systems have reshaped military operations by taking over repetitive or high-risk tasks. Autonomous drones are used in missions, minimizing the risk to human soldiers. AI systems can process and analyze data from these drones right away and provide insights faster than manual ways. This usage shows potential uses in aviation, like employing drones for aerial inspections of aircraft or airports and that way improving efficiency and safety. The ethical concerns associated with autonomous systems, particularly in military applications are a very big concern among the people. These concerns extend to aviation, like in discussions about fully autonomous passenger aircraft. Trust in AI systems is a main focus for these operations. Passengers and crew must be assured of the system's safety and reliability before such technologies are used widely. (Lin, Abney & Jenkins 2017, 55,72,113.)

These support systems use AI to process huge amounts of data and provide insights for military leaders. These systems integrate many streams of data from multiple sources, providing action plans for military commanders in high-stakes scenarios. These could be valuable in aviation, particularly for air traffic management. AI-powered systems could process data on weather, air traffic and potential hazards to recommend optimal flight paths, reducing congestion and enhancing safety. As aviation becomes increasingly digitized, the industry could adopt military-grade AI solutions to safeguard cybersecurity against threats. Airlines and regulatory bodies could integrate these systems to monitor and detect cybersecurity risks before they escalate. (Horowitz 2019, 89,114, 127.)

Singer and Friedman (2014, 144) go into the transformative impact of AI on cybersecurity, describing how machine learning algorithms detect and respond to threats at unprecedented speeds. In the military, these systems not only protect sensitive data but also predict potential breaches by analyzing patterns of past attacks. Aviation can use these ways to secure its critical digital infrastructure, including flight control systems, passenger data and airline operations. Caution against over-reliance on AI in cybersecurity is important, because persons with wrongful intentions are also leveraging AI to create more unique threats. This highlights the need for continuous innovation and collaboration across all sectors. Aviation stakeholders should invest in adaptive AI systems that are capable of staying ahead of new threats and keeping the human oversight to maintain control. (Singer & Friedman 2014, 133,187.)

2.4 Current technologies and practicalities

This subchapter shows the bridge between artificial intelligence technology and the practicalities that are currently in use. There is also considerations of the benefits and challenges of artificial intelligence in the future. These are important topics to consider if artificial intelligence can truly add value without compromising training quality and safety standards.

Lufthansa Aviation Training (LAT) have partnered with 3spn Learning to develop an innovative AI-supported training program for cabin crew. The aim of the initiative is to take advantage of the latest advancements in artificial intelligence and technologies to create more effective and efficient training process. The training program utilizes Apples Vision Pros, that are new Augmented reality (AR) headsets. The headsets deliver an immersive and interactive learning experience. The algorithms inside the system analyze trainees' performance in real-time and provide personalized feedback. This way it is also possible to create adaptive learning pathways to different trainees. This allows the training content to be tailored to individual needs and skill levels. Content adaptation ensures a more engaging and relevant learning experience. The use of AI enables the simulations of many different scenarios like routine procedures to emergency situations. This kind of training helps cabin crew members develop necessary skills and confidence to handle every arising situation that is coming their way during the flight. Programs also include virtual coaching and mentoring, giving the trainees guidance and support from instructors. (Lufthansa Group Innovation Runway 2023.)

Urban Air Mobility (UAM) is advancing quickly with promising looking opportunities for cities to support more sustainable and economically better transportation solutions. As cities grow, so do traffic congestion and pollution. This is driving the need for different forms of transit that can address these challenges. UAM's potential to help with road congestion goes well with global and regional goals to reduce carbon emissions and making it a good option for future urban

development. (Deloitte 2021.) The development of UAM vehicles powered by electric and renewable energy sources not only lowers the environmental footprint but also supports the transition toward low-carbon urban environments, that is a major focus of the European Commission's sustainable urban mobility strategy. (European Commission 2021.)

Urban Air Mobility promises large commercial benefits across several sectors, including transportation, logistics, tourism and healthcare. As technology and infrastructure evolve, UAM could become a part of urban transport transforming the way people and goods move inside cities. Still the regulatory and technological challenges remain and specially concerning air traffic management and infrastructure needs. Ongoing research and pilot programs will be essential in understanding UAM's commercial future.

2.5 Potential technologies in the future

Researchers in the Engineering Design and Innovation Centre (EDIC) of the National University of Singapore were researching the possibilities of combining generative AI with mixed reality technology to better the cabin crew trainings. This innovative project focuses on creating flexible and effective training methods that could provide a realistic and immersive learning environment for cabin crew members. Generative AI is used to make realistic training scenarios that can adapt to the trainee's actions and decisions in real-time. This gives an interactive and personalized training experience, where trainees can practice their skills in a safe and controlled environment. The use of mixed reality technology, that combines elements from both augmented reality (AR) and virtual reality (VR), enhances the realness of the training scenarios and makes them more engaging. The project also focuses on the importance of flexibility and accessibility in training methods. By using cloud computing and mobile technology, the training modules could be accessed remotely, allowing cabin crew members to train at their own convenience and pace. This flexibility not only makes the training process more convenient but also ensures that all crew members receive consistent and high-quality training, regardless of their location. (National University of Singapore 2023.)

One of the most promising AI applications in cabin crew training is the development of AI-powered conversational scenarios. These simulations use natural language processing to create realistic interactions with virtual passengers, giving the trainees the possibility to participate in realistic exercises. Unlike the more used role-playing exercises where students interact with instructors or other students the AI-driven conversational scenarios give possibilities for a wide range of passenger personalities and behaviors that can adapt in real time based on the trainee's responses. For example, AI can make multiple passenger scenarios, from a passenger frustrated

with delays to a nervous flyer needing reassurance. This type of training improves a cabin crew member's ability to handle possible situations onboard, develop empathy and respond appropriately under pressure. AI can assess responses and provide instant feedback, highlighting areas for improvement and suggesting different approaches. These kinds of training methods are crucial in preparing cabin crew to handle high-stress situations effectively. (AI-Humans 2023.)

Machine learning algorithms are being integrated more into aviation training programs to personalize the learning experience for crew members. AI systems can analyze large amounts of training data, performance data and behavioral patterns to tailor learning modules based on individual needs. This ensures that every student receives instruction that targets their specific strengths and weaknesses. (Air World Academy 2024, 5.) An AI-powered system can track a student’s progress with different training exercises and automatically adjust the difficulty level of these tasks. If a student struggles with conflict resolution scenarios, the system could recommend different kinds of simulations focused on de-escalation techniques. If a student excels in emergency drills, the system could fast-track them to more advanced scenarios.

This way of conducting the learning could enhance efficiency by reducing unnecessary repetition and giving the students the possibility to focus on areas that they need to improve. AI can identify larger trends in performance across different training batches, providing valuable insights to training planners on common challenges faced by new students.

The combination of AI and Augmented Reality (AR) is changing the way cabin crew members learn about aircraft operations and service. AR technology puts digital content into real-world environments, giving the students possibilities to interact with virtual elements in a physical space. When used with AI, AR-based training becomes even more effective by offering real-time guidance and adaptive learning paths. For example, AR headsets could be used to practice safety drills, where students practice emergency procedures like evacuation or firefighting and AI gives instant feedback. This gives a more hands-on learning experience than the traditional classroom training. AI can also guide students through aircraft familiarization exercises by giving important information, like emergency exit locations, equipment usage information and passenger assistance guidelines, inside a real aircraft cabin. (2MQ Consulting 2023.)

Another big advantage of AI-enhanced AR training is the ability to simulate rare or extreme emergency scenarios that may be difficult to do in physical training environment. By exposing students to these high-stress situations in a safe and controlled virtual setting, AI makes sure they are well-prepared to handle them in real life. While technical proficiency is essential for cabin crew, soft skills such as communication, teamwork and emotional intelligence play an important role in

ensuring passenger safety and comfort. AI is now being used to enhance the development of these skills through behavioral analysis and immersive simulations. AI-powered training programs can analyze tone of voice, facial expressions and body language to give students feedback on their interpersonal skills. If a student shows signs of nervousness or hesitation when handling a difficult passenger, AI can identify these and suggest improvements in confidence building techniques. AI can create realistic training scenarios that require teamwork and coordination, helping students to improve their ability to work with colleagues during high-pressure situations. AI also plays a role in cultural sensitivity training, making sure that cabin crew members are able to handle diverse passenger needs with empathy and professionalism. By simulating interactions with passengers from different cultural backgrounds, AI helps students develop cross-cultural communication skills that are increasingly important in today's global aviation industry. (Air World Academy 2024, 6.)

Artificial intelligence gives a lot of possibilities to develop the cabin crew trainings into more realistic and comprehensive. Technologies are constantly evolving and new innovations are coming almost daily. These might be the future of cabin crew training. Artificial intelligence is going to be part of everyday life in the future and all cabin crew training facilities should start integrating AI into their training programs already. The traditional physical training environment might not be enough in the future and AI gives a lot more possibilities to use small training facilities in a more efficient way without big physical training equipment.

2.6 Benefits of the use of artificial intelligence

Artificial intelligence is changing how training is done in many industries like aviation. AI can offer many advancements for cabin crew training by making learning more efficient, personalized and cost-effective. In the future, AI will likely play an even bigger role in training programs, helping to improve learning, safety and overall performance. One of the biggest advantages of AI is that it can provide personalized training for each trainee. Traditional training ways are all the same for all students, but AI can analyze individuals' performance and give feedback specific to that person. This means that trainees can focus on improving their weak areas and that way leading to an overall better learning outcome. (Cameron & Green 2019, 45-50.)

Another important advantage of AI is that it can help with continuous learning. AI-using platforms can keep a track of a person's progress through their career and suggest refresher training when needed. This ensures that skills remain up to date and that crew members do not forget important procedures. This way it can be also giving the opportunity for the person to develop their professional skills and keep the knowledge level up to date with recent changes. (Epstein & Buhovac 2014,135-140.)

AI can also help in reducing training costs. Training cabin crew requires a lot of time, resources and instructors, all of these resulting in training costs. AI-based learning programs can reduce the need for physical training spaces and human instructors, making the trainings more cost-efficient. This does not include all the trainings, but some parts of the training can be done more efficiently with the use of digital and AI-tools. (Deloitte, 2021.) Airlines can invest these savings into other areas, like improving service or safety measures.

Another application for AI is that it can assist in language and communication training. Cabin crew members work with international passengers and other crew members, so understanding different languages and cultural behaviors is important. AI language programs can help crew members practice communication skills in different languages and scenarios. Airline industry does have its own type of language and a lot of difficult vocabulary, so mastering those is important for a new cabin crew member to understand the trainings and the work itself. This is bettering the airlines image and the experiences that the customers and the crew members will have. (European Commission 2021.)

Even though AI cannot fully replace human instructors, combining AI with traditional training methods can improve the quality and quantity of cabin crew training in the future. With the help of AI training facilities can accommodate more trainings as they do not need a physical space. Most of the trainings are done with simulators and with the use of AI those can become more efficient and realistic. With modern technology also less space consuming to leave possibilities for different kind of simulators. AI can make training more effective, engaging and accessible while ensuring that cabin crew members are well-prepared for their role and responsibilities.

2.7 Challenges and risks

The concerns of data privacy, security, autonomy and consent do come into play when thinking about using AI or automation in trainings. There are also legal considerations including agency approval, labor acceptance, liability and copyright/intellectual property protection considerations. Users' wellbeing is also a challenge and a risk in using AI, as there are user concerns. AI can be used in an infringement of personal rights like using likeness, voice or personality without consent. Transparency and accountability issues could be solved by using open-source software and explainable AI approaches. Trainings need to be traceable for the training design and development. For example, students can question where the data comes from and how it is used in simulations. Individual data is another question and the privacy of the user's own data. The amount and quality of data needs to be known beforehand. AI tools have limitations and can occasionally provide inaccurate data to the users. This can cause the lack of critical thinking and

decision making. AI outputs are impressive but never quite close to the human production. The speech and its understandability are an important factor in the trainings. Also, AI tools are subject to biases. Some data can contain inaccurate and inappropriate information. There might be a lot of misinformation and those need to be made sure are not in the training material. (Nguyen, Sonnenfeld, Finkelstein, Alonso, Gomez, Duruaku & Jentsch 2023.)

One big challenge is that AI cannot replace human interaction. In traditional training, human instructors help trainees with feedback, guidance and real-world experiences that AI cannot do. AI is very good at simulating different situations, but it is not very good at teaching soft skills, like how to communicate with people, how to work in a team and how to understand emotions. Human interaction during the trainings is also a part of integrating into the work community as the trainings are done among the colleagues. These are very important skills for cabin crew members. (Graham, 2013.) If AI is used too much and real instructors are removed, trainees don't develop these important human skills.

Another big problem is that AI can sometimes make mistakes when evaluating trainees. AI training programs use machine learning to look at how trainees perform, but sometimes these AI systems have biases if they are not trained properly with many different kinds of data. (Epstein & Buhovac, 2014.)

Using AI in training can also have big problems with security and ethics. AI training needs a lot of data, like how trainees perform and even some personal data. This brings up concerns about how this data is stored and protected. If this information would be hacked or leaked, it could be used in the wrong way and that is a big risk for privacy and cybersecurity. Airlines and training organizations must be very careful to keep trainee data safe and follow strict data protection rules. (Deloitte, 2021.) (European Commission, 2021.)

If the AI system has bias, it may not correctly understand how good a trainee is, and some people might pass training even if they are not really ready for the job (Wilson 2023). This is very dangerous because cabin crew members need to be fully prepared for their responsibilities, especially during emergencies. Human instructors are able to change the training based on how the trainee responds, but AI cannot always do that.

To solve these problems, the best way is to use a mix of AI and human-led training. AI should be used to help make training better and more efficient, but it should not completely replace real human instructors. A good training program should have human instructors with AI tools, so that cabin crew members can learn from technology while also getting important real-world knowledge and skills from experienced instructors. (Kats & Alevantis, 2015.)

Despite these promising benefits, there are several challenges associated with AI in ATC. One primary concern is the reliability of AI systems. AI algorithms depend on the quality of the data it is trained on and if this data is biased or incomplete, the system could make bad predictions, leading to safety risks. For example, incorrect data could result in wrong decisions like assigning planes to unsafe flight paths or misjudging the severity of weather conditions. Another concern is cybersecurity. As AI systems become more integrated into ATC, the risk of cyberattacks grows. AI-powered ATC systems are vulnerable to hacking and any security breach could have huge consequences. Protecting AI systems from cyber threats is crucial to maintaining trust in these technologies. Ensuring that proper cybersecurity measures are in place is essential to the safe operation of AI in ATC.

Despite the many advantages, the integration of AIMEE (AI-Mediated Efficiency Enhancer) into air traffic control systems do not come without its challenges. As with any AI-driven system, AIMEE depends on the quality and accuracy of the data it processes. If there are any errors in data input or algorithmic mistakes, this could lead to incorrect recommendations or compromising safety and efficiency. As AIMEE handles sensitive flight data and makes critical decisions, making sure the system’s protection from cyber threats is crucial to maintaining trust in AI-assisted air traffic control. (European Commission, 2021.)

3 Cabin crew new entrant training

The cabin crew new entrant training has a lot of regulatory requirements that need to be followed, and there are operator differences in the way of conducting trainings. In this chapter, there is information about the regulatory side of cabin crew new entrant training, including safety training, first-aid training and service training. This chapter focuses on understanding the training as a whole package and gives some insight of the instructor's tasks during the trainings. This is needed to be gone through before moving into the possibilities and challenges of artificial intelligence in cabin crew training.

Cabin crew training today is a strictly structured process that focuses mostly on safety with compliance with aviation regulations and adding on the service excellence. Trainings include theoretical learning, practical exercises and examinations. Training programs are designed to give cabin crew members the skills needed to handle emergencies, manage passengers and ensure compliance with aviation standards. Aviation regulations come from Civil Aviation Organization (ICAO) and in Europe from European Union Aviation Safety Agency (EASA).

Cabin crew instructors need to balance regulatory requirements with the need to adapt trainings to evolving passenger expectations and operational complexities. Trainings today rely on classroom lectures, hands-on trainings and physical training equipment like door trainers and fire-fighting simulators. (Graham 2013, 147.) These ensure that the trainees can react to emergencies effectively and gain confidence in safety procedures in a safe and controlled environment. Regulatory frameworks often limit the possibilities for innovation in teaching methods. (Cameron & Green 2019, 85.)

Another important component of the cabin crew training is the soft skills development. Including communication, conflict resolution and cultural sensitivity. These skills are very important for managing passenger encounters onboard and providing positive customer experiences. Role-playing scenarios and feedback from instructors and fellow trainees help to connect the theoretical knowledge and real-world usage. (Epstein & Buhovac 2014, 73.)

These training ways have been proven to be effective but in aviation field it's always been tried to be more efficient and innovative. These are resource intensive and time-consuming methods and instructors need to accommodate many different learning paces and styles. Reliance on physical training equipment poses logistical challenges, especially for smaller airlines with limited access to like resources. These highlight the importance of recurrent training in maintain skills that are needed for cabin crew members. These are being delivered from instructors with theoretical

lessons and practical simulations. Continuous assessments and updated in procedures are critical for operational excellence.

3.1 Safety training

The European Union Aviation Safety Agency (EASA) mandates comprehensive safety and security training for cabin crew members as part of their certification process. It states in the EASA's Part-CC (Cabin Crew), cabin crew members must attend initial training that includes safety procedures and security protocols to ensure they can respond effectively to emergencies during flights. After initial training, the trainees get their cabin crew attestations that is their license to be able to work as a cabin crew member. (EASA 2022, 45-48.)

Arter initial training that is based on the EASA rules and regulations, the students go through the operator specific training. With the initial training and the attestation alone, no trainee is able to work with an airline without an operator or airline specific training. In this training in includes the specific procedures of the specific aircraft types the trainees are going to be flying with and also the airline specific procedures on first aid and service.

3.1.1 Initial training

The initial training has both theoretical and practical components. Trainees are introduced to the procedures of aviation safety, emergency procedures and the importance of maintaining a secure environment for passengers and crew. Key topics covered include aircraft evacuation procedures, firefighting procedures, security incident scenarios and the use of emergency equipment. Practical exercises are an important part of the training, giving the trainees the possibility to practice their skills in safe and controlled simulated environments.

Figure 1. The components of the cabin crew initial course (Easasolutions.com).

For example, cabin crew members practice evacuating an aircraft using evacuation slides, using fire extinguishers and managing security threats. These exercises help trainees to develop the necessary skills to handle emergencies effectively. EASA also emphasizes the importance of teamwork and communication during emergencies. Trainees learn how to coordinate with other crew members, communicate with passengers and follow the instructions of the flight crew to ensure a safe and orderly way of doing. (EASA,2022, 52.)

In Finland, the Finnish Transport and Communications Agency, Traficom, oversees the certification and training of cabin crew members. Traficom's regulations go closely together with EASA's requirements, ensuring that cabin crew members receive high quality safety and security training.

Traficom mandates that cabin crew members complete a comprehensive initial training program, which includes detailed safety and security training components. This training focuses on both theoretical knowledge and practical skills, providing trainees with the useful tools to respond effectively to emergencies. The training includes hands-on practice with emergency equipment commonly found on aircraft, like evacuation slides, fire extinguishers and emergency medical kits. Trainees practice using this equipment in many different scenarios like evacuating an aircraft, extinguishing fires and providing first aid to passengers. (Traficom 2024, 12-15.)

One of the unique aspects of Traficom's training aspects is its emphasis on real-life scenarios. Trainees participate in simulated emergency situations, where they must assess the situation, have appropriate responses and communicate effectively with other crew members and passengers.

These simulations help trainees build confidence and develop their problem-solving skills, ensuring they are well-prepared to handle emergencies.

Trainees begin with theoretical lessons covering the principles of aviation safety, emergency procedures, security protocols and the use of emergency equipment. These sessions are interactive, incorporating multimedia presentations, videos and case studies to enhance learning. Hands-on practice sessions give trainees to apply their theoretical knowledge into action. They practice evacuating an aircraft using simulators, firefighting procedures, managing security threats and providing first aid to passengers. Trainees also learn to use emergency medical kits and other equipment found on aircraft.

Realistic simulations are a key part of the training. Trainees participate in mock emergency situations, where they must adapt to the situation, provide appropriate responses and communicate effectively. These simulations help trainees to memorize procedures from doing them and develop their problem-solving skills. Throughout the training, trainees are continually assessed on their knowledge and skills. This includes written exams, practical tests and performance evaluations during simulations. Feedback from instructors helps trainees improve and refine their skills, ensuring they are well-prepared to handle emergencies. Continues feedback is needed to address shortcomings during the training and provide individuality.

Crew Resource Management (CRM) training is an essential component of cabin crew training as mandated by EASA and Traficom. CRM focuses on the effective use of all available resources, including human resources, equipment and information, to enhance safety and operational efficiency. Crew Resource Management (CRM) training is an important component of cabin crew training, focusing on improving teamwork, communication and decision-making skills to better safety and operational efficiency. CRM training is recognized as a standard practice throughout the aviation industry and is used by leading airlines to reduce the frequency of accidents and improve overall flight safety. (IATA 2023.)

CRM training is about human factors and how they affect flight safety. It emphasizes teamwork, communication, decision-making and situational awareness. Trainees learn how to work effectively as a team, communicate clearly and assertively, and make informed decisions under pressure. Practical exercises and simulations are used to reinforce these skills, ensuring that cabin crew members can work together seamlessly during normal operations and also in emergency situations.

For example, trainees participate in scenarios where they must collaborate with other crew members to manage a medical emergency or respond to a security threat. These exercises help

trainees develop the interpersonal and cognitive skills needed to handle the safety and well-being of passengers and crew. CRM training also includes case studies where trainees go through some accidents or incidents and evaluate the human factors in those cases. From case studies it is easier to learn the topics and have real examples on what is needed to be done better.

Traditional simulators are an important part of safety training, but they need a lot of maintenance and special facilities. Planning training is a big task and the heavy use of the equipment can lead to breakdowns, which can cause extra costs and make planning harder. Many airlines are already looking for better and more modern ways to train. Newer technology, like virtual reality (VR) or portable training tools, can provide different ways to do trainings. These ways could reduce the need for big training facilities, that might save money even though new technology can be expensive in the beginning. Some parts of training can already be done online or before coming to the training center, making the process shorter and faster. The rules however for safety in aviation are very strict. Many rules apply to all airlines and are not specific to one region or type of operation. These rules limit how much training can happen outside the classroom or by using new methods. To improve training while following these rules, airlines, technology providers and regulators need to work together. This teamwork will help create training methods that are safe and effective. (Baldwin 2017, 33–36; Doganis 2019, 329–330.)

3.1.2 Operator training

Cabin crew members must go thorough comprehensive operator and aircraft type-specific training before being able to work on board aircraft within the scope of Regulation (EU) No 965/2012. According to the regulation, cabin crew must complete aircraft type-specific training and operator conversion training, that ensures their competence in handling normal and emergency operations on a specific aircraft type and with specific airline's procedures. (Regulation (EU) No 965/2012, ORO.CC.125.)

Aircraft type-specific training must include hands-on trainings and practical exercises like on the actual aircraft or on a representative training simulator. The training must cover detailed knowledge of aircraft systems relevant to cabin crew duties, including the location and operation of all the safety and emergency equipment. It also involves the actual operation of each type or variant of normal and emergency exits in both normal and emergency modes. Additional elements include fire and smoke protection equipment, evacuation slides and the usage and operation of oxygen systems and restraints related to pilot incapacitation scenarios. (Regulation (EU) No 965/2012, ORO.CC.125.)

Operator conversion training familiarizes cabin crew with the specific operator's procedures and onboard configuration. This includes the layout and location of all safety equipment, normal and emergency procedures specified to the operator and procedures for handling passengers, including crowd control. It also involves operator-specific fire and smoke training using equipment representative of that carried on board, as well as procedures for evacuation, pilot incapacitation and crew resource management. (Regulation (EU) No 965/2012, ORO.CC.125.)

When a cabin crew member is assigned to a new variant of an aircraft type, they already operate, or to an aircraft type with different safety equipment or procedures, they must complete the differences training. This ensures they are proficient in any new or altered features. The extent of the differences training depends on a comparison between the crew member’s previously completed training and the new aircraft’s configuration. As with other forms of training, this may include practical training on the aircraft or a suitable training simulator. (Regulation (EU) No 965/2012, ORO.CC.130.)

After successfully completing type-specific and operator conversion training, the cabin crew member must undergo supervised familiarization flight on the specific aircraft type. This step ensures they can apply their training in real operational conditions before being considered part of the minimum required cabin crew on a flight. (Regulation (EU) No 965/2012, ORO.CC.135.)

This approach to training ensures not only regulatory compliance but also a high standard of safety and preparedness among cabin crew across the EU. Operators have different ways of doing the trainings and different training facilities have different equipment. Training is still supervised by the national regulators that ensure that the European Union Aviation Safety Agency’s regulations are being followed.

3.2 First aid training

The European Union Aviation Safety Agency (EASA) mandates comprehensive first aid training for cabin crew members as part of their certification process. According to EASA's requirements detailed in Part-CC (Cabin Crew), initial training must cover a broad spectrum of first aid skills to ensure cabin crew can respond effectively to medical emergencies during flights. (EASA 2022, 45-48.)

The initial training program includes both theoretical and practical components. Trainees are introduced to basic human anatomy and physiology that forms the foundation for understanding various medical conditions and the appropriate first aid responses. Key topics in the course include cardiopulmonary resuscitation (CPR), automated external defibrillator (AED) use, managing

bleeding and shock, wound care and handling of fractures and burns. Practical trainings are an important part of the trainings, allowing trainees to practice their skills in simulated ways. For example, cabin crew members practice CPR on mannequins that provide real-time feedback on the quality of compressions and ventilations. Trainees also learn to use AEDs effectively, with simulations mimicking in-flight scenarios where a passenger might experience a cardiac arrest. EASA also requires training on specific medical conditions that can happen during flights, like heart attacks, strokes, diabetic emergencies and allergic reactions. Trainees will learn how to recognize the signs and symptoms of these conditions and provide the needed care. For example, they are trained how to administer epinephrine auto-injectors for severe allergic reactions and provide oxygen therapy for passengers with respiratory issues. (EASA 2022, 50.)

In Finland, the Finnish Transport and Communications Agency, Traficom, is responsible for overseeing the certification and training of cabin crew members. Traficom's regulations align closely with EASA's requirements, ensuring that cabin crew members are well-prepared to handle medical emergencies during flights. Traficom makes sure that cabin crew members complete an initial training program, that includes a detailed first aid section. This training focuses on both theoretical knowledge and practical skills, giving the trainees with the necessary tools to respond well to medical emergencies. (Traficom 2024, 12-15.)

The training includes hands-on practice with first aid equipment commonly found on aircraft, like first aid kits, oxygen bottles and medical kits. Trainees learn how to use these tools in different kinds of scenarios. For example, they practice putting bandages and splints, administering medications and using oxygen bottles to help passengers with respiratory distress. One of the unique aspects of these training program is its focus on real-life scenarios. Trainees participate in simulated in-flight emergencies exercises, where they must assess the situation, provide first aid and communicate with the flight crew and ground medical support. These simulations help trainees develop critical thinking and decision-making skills, making sure that they are well-prepared for medical emergencies they might encounter during their flights. (Traficom 2024, 18.)

The training typically is made with a combination of classroom instruction, hands-on practice and simulated scenarios. It starts with theoretical lessons that cover the basics of the rules of air, common medical emergencies and first aid. These sessions are interactive and incorporate presentations, videos and case studies to deepen learning. Practical training sessions come next, allowing the trainees to apply their theoretical knowledge to life. They practice CPR on mannequins, use AEDs, apply bandages and splint fractures. Trainees also learn to use first aid kits, oxygen bottles and other medical equipment found on aircraft. Realistic simulations are an important part of the training. Trainees participate in in-flight emergency simulation, where they

must assess the situation, provide first aid and communicate with the flight crew and on-ground medical support. These simulations help trainees build confidence and develop their skills. Throughout the training, trainees are all the time assessed on their knowledge and skills. This includes written exams, practical tests, and performance evaluations during simulations. Feedback from instructors helps trainees improve and refine their skills.

The initial part of the cabin crew members course does entail a lot of information about inflight medical emergencies and basic first aid. After the initial training comes the operator training in which the trainees go through the specific procedures, practicalities, equipment and hands-on practices of the airline in question. Initial training gives good basic knowledge of these topic but in the operator training the trainees get the actual practicalities of that airline.

3.3 Service training

Service training is part of the operator training that includes the airline specific rules and procedures service vise. This includes many aspects of passenger interactions to also hardware that is used inside the aircraft. New cabin crew members need to internalize a lot of information and practicalities in a quite short period of time.

The aviation industry is known for high standards of service excellence, particularly from cabin crew members who are in the frontlines of passenger interactions. A new entrant course for cabin crew typically includes intensive service training to make sure that all crew members know these high standards. This training is designed to give cabin crew members the necessary skills to deliver great service, maintain safety standards and provide a good passenger experience. In the cabin crew initial training, the focus is on the safety and first aid responsibilities, but later in the operator's course towards the end of the entrant's journey, service skills are perfected.

Customer service is a most shown part of cabin crew responsibilities. New entrants are trained in many aspects of customer interaction, including communication skills, handling different kinds of passenger and providing personalized service. Effective communication is essential for making sure that passengers feel valued and understood. (Graham 2018, 45.) Training sessions often include role-playing scenarios to practice responding to many of the passenger needs and behaviors. These role-playing sessions help new crew members to build confidence and improve their problem-solving skills, which are crucial when dealing with real situations on board. In addition to verbal communication, non-verbal communication is also important. Body language, eye contact and facial expressions play a significant role in showing warmth and professionalism. New entrants are trained to maintain a positive and approachable look, even in challenging situations. The ability

to remain calm and composed under pressure is a key feature of a successful cabin crew member. (Graham 2018, 48.)

Cabin crew members in today's world interact with passengers from a diverse cultural background. Service training includes lessons on cultural sensitivity and diversity to keep up an inclusive environment. Cabin crew members learn about different cultural practices, communication styles and dietary preferences. This knowledge helps to give a more personalized and respectful service to all passengers. Understanding cultural differences is important to avoid misunderstandings and to make a positive passenger experience. For example, certain gestures or expressions may have a different meaning in different cultures. Cabin crew members are trained to be aware of these differences and adapt their actions and words accordingly. This aspect of training promotes mutual respect and enhances the overall experience on board. (Jones 2019, 52,56.)

First impressions are crucial in the aviation industry and personal presentation is one of the key focuses of cabin crew training. New entrants are instructed on grooming standards, uniform maintenance and professional behavior. Keeping up with these standards helps create a positive image for the airline and shows passengers authority and recognizability. Grooming standards include guidelines on hair, makeup, jewelry and attire. Cabin crew members are expected to always present themselves in a neat and thought after manner. This attention to detail shows the professionalism of the airline and enhances the overall passenger experience. Additionally, crew members are trained in etiquette and hospitality to ensure they carry themselves with grace and confidence. (Chandel 2023, 2-4.)

Leadership and followership training in the new entrant course for cabin crew is designed to give trainees with the necessary skills to support the team effectively. Training is focusing on understanding leadership roles, developing followership skills, team dynamics, conflict management, decision-making and continuous improvement. This way making sure that cabin crew members can contribute to a safe, efficient and positive travel experiences. The integration of leadership and followership training highlights the importance of both roles in achieving the common goal of great service and safe flights. Followership training is equally important, as it focuses on the qualities that make an effective follower. In the start of the cabin crew members career it is important to understand the roles and responsibilities that go with seniority and in that way hierarchy. This includes active listening, reliability and the ability to give and receive constructive feedback. New entrants are taught to recognize the value of followership in supporting the leader and contributing to the overall success of the team. Good followers are proactive, take initiative and provide support to their colleagues. (Jones 2019, 68.)

In conclusion, the new entrant course service training for cabin crew is an overall program that addresses all aspects of the cabin crew role. It prepares individuals to shine in customer service, prioritize safety, respect cultural diversity, deliver high-quality service and maintain a professional appearance. This training ensures that cabin crew members are well equipped to meet the demands of their role. The continuous investment in training and development highlights the airline's commitment to service excellence and safety, reinforcing its reputation in the competitive aviation industry. This is the first training module for them and companies provide later on some extra training for service and sales to keep up with the passenger expectations and the company’s brand.

4 Impact of AI on cabin crew training and regulations

This chapter focuses on analyzing how the introduction and the use of artificial intelligence could affect cabin crew training practicalities and the industry as a whole. As AI technologies develop and become more accessible, training facilities and airlines may have to adopt to them. By going through these factors, this chapter supports the overall goal of the thesis: to understand the real potential of artificial intelligence in cabin crew new entrant training and to get ideas for the suggestions for its responsible use.

The role of cabin crew instructors is going to be changing significantly with the integration of AI into trainings. This way presenting new challenges and opportunities. As highlighted by Knott (2023), AI-using training programs will play an important role in changing the responsibilities of instructors. Virtual reality simulations and AI interaction scenarios are expected to create immersive learning environments while requiring instructors to be welcoming to such advanced tools.

Lufthansa Aviation Training has already implemented these technologies, like blending AI with traditional training methods to better the experience of cabin crew training (Lufthansa Aviation Training 2023).

Training needs for future cabin crew instructors will rise to keep up with these developments. Proficiency in AI and VR systems is essential for using these technologies effectively in training programs. According to Forbes (2024), this includes familiarity with machine learning and the ability to troubleshoot AI systems during training sessions. Instructors will need a good set of data analysis skills, allowing them to use AI-generated insights to improve trainings. Even though the growing reliance on technology, the importance of human connection remains at the core. Instructors need to be making relationships with trainees and creating a welcoming learning environment. Adaptability is also a critical skill for the future instructors. As AI and related technologies continue to evolve, instructors will need to stay informed about the latest innovations, methods and best practices. Continuous professional development will become a fundamental aspect of instructor’s careers. That way ensuring they can respond well to the evolving demands of the industry.

The future of cabin crew instruction in the AI era represents a blend of technological expertise and interpersonal skills. The high level of knowledge from their experience is still in use and the changing environment gives them an opportunity to use different kinds of learning methods. By using these advancements and maintaining a strong focus on the human factors in their role,

instructors can better the quality of trainings and prepare new cabin crew members for the complex world of aviation.

4.1 Human-AI interaction

Human-AI interaction in the aviation industry is an evolving dynamic that offers both opportunities and challenges. In the context of cabin crew training, this interaction plays an important role in defining how effectively AI can be used to enhance efficiency, safety and the overall passenger experience. In its core, successful human-AI interaction relies on trust and collaboration between humans and AI systems. For cabin crew instructor this means viewing AI not as a replacement for the traditional ways of teaching but as a powerful tool to improve their skills and capabilities.

According to the European Union Aviation Safety Agency (EASA, 2020), AI systems should be designed with a human-centric approach, focusing on their role in supporting rather than not using human decision making. This is particularly important in safety critical environments like aviation, where the safety and well-being of passengers depend on good judgment and quick actions by trained professionals.

One main aspect of human-AI interaction is the need for clear communication and understanding. AI systems, like virtual assistants or predictive analytics tools must be clear in their operations, providing cabin crew with real insights that are easy to interpret and apply to real life. For example, AI-powered tools that monitor passenger behavior and predict potential problems can help cabin crew anticipate and address issues before they escalate. To use these tools effectively the crew members must be equipped with the knowledge and confidence to understand and act on AI provided recommendations. (Fang 2024.)

One more critical part is the sharing of the responsibilities between humans and AI. While AI is great at processing large amounts of data quickly and identifying patterns, it lacks the knowledge-based judgment and empathy that humans bring to interactions. Cabin crew will continue to play an important role in tasks that require emotional intelligence, like calming an anxious passenger or working through a dispute. The integration of AI should focus on complementing these human strengths rather than overshadowing them. (Hilderman 2022.)

Training programs could play a key role in enhancing human-AI interaction. Cabin crew members need to learn how to use AI tools and also understand their limitations and ethical considerations. Algorithmic bias and data privacy issues must be addressed to make sure that AI systems are fair, reliable and goes with the values and regulations of the aviation industry. Training should highlight

the importance of critical thinking and enable crew members to question and validate AI-generated content rather than relying on them without a thought. (Boston Institute of Analytics 2024.)

According to GOOSE Recruitment (2024), the introduction of AI should be put out there as an opportunity for professional growth and learning new skills rather than a threat to employment. The psychological impact of AI on cabin crew and instructors is an important consideration. As AI systems become more common, concerns about job security and the possible loss of human connection in interactions may arise. To lower these challenges, airlines and training organizations must form a culture of collaboration and continuous learning and with that reassuring cabin crew and instructors that their roles remain the same and valued.

In summary, human-AI interaction in the aviation industry is basically about having the right balance between using the strengths of AI and keeping the unique capabilities of humans. For cabin crew, this means embracing AI as a partner in enhancing safety, efficiency and passenger satisfaction while continuing to provide the empathy and adaptability that only humans can offer. For instructors this means getting new ways of teaching and opportunities to develop new skills and grow professionally. By prioritizing trust, communication, ethical considerations and effective training, the aviation industry can make sure that human-AI interaction is a positive factor for innovation and progress.

4.2 Regulatory and Ethical considerations

The integration of Artificial Intelligence into cabin crew training presents both regulatory and ethical considerations that must be carefully addressed to ensure safety, compliance, and fairness.

There is a potential impact of artificial intelligence on aviation safety culture. Ai is impacting aviation safety culture with the use of intelligent assistants. The assistants have a potential to work semi-autonomously or fully autonomously in collaboration with human crew. Some negative risks could potentially be the delegating of duties to the responsibility of the AI, meaning some tasks needing a human decision making would be done completely autonomously. As a good tool it worked great in the background, ensuring safety and strengthen safety culture by adding tools and support. There is still a need for a safeguard and limitations to the use of AI in the airline operations. (Kirwan 2024, 3,4,19,21,30.)

Incorporating artificial intelligence into aviation training needs good grounds to establish safety standards and certification processes. The Federal Aviation Administration (FAA) focuses on the importance of complying with existing safety procedures when adding new AI-based functions in training programs. (FAA 2024, 10.) This would include ensuring that AI applications in training

simulators meet the high safety assurance methods to maintain the safety and reliability of flight operations.

The nature of AI technology poses challenges for regulation. The continuous evolution of AI makes it difficult to come up with stable legal definitions and frameworks and with that potentially leading to outdated regulations and unforeseen risks quickly. A balance between regulations and flexibility is essential to use technological advancements while keeping the safety levels high. (ALG Global 2023, 2.)

Ethics of the use of AI in training programs must address issues of bias and discrimination. AI systems trained on biased data can perpetuate existing prejudices, leading to unfair treatment of certain groups. Ensuring that AI algorithms are transparent and that their decision-making processes are explainable is crucial to prevent such outcomes. (D'Souza 2023, 3.) Additionally, the potential impact of AI on employment in the aviation sector is raising ethical concerns. As AI systems become more capable, there is a risk of job displacement among cabin crew members or other airline personnel. Addressing this issue requires strategies for retraining and skilling staff to work alongside AI technologies and by that mitigating negative employment effects. (Aviathrust 2025, 4.)

The European Union's Artificial Intelligence Act (AI Act), also known as Regulation (EU) 2024/1689, was made to have same rules for artificial intelligence inside the EU. The Act aims to promote the development of human-centric and trustworthy AI while making sure of a high level of protection for health, safety and fundamental rights of everyone. (European Parliament and Council 2024, 1.)

The AI Act entails a risk-based approach, categorizing AI systems into four different risk levels: unacceptable, high, specific transparency and minimal risk. Unacceptable risk AI practices are prohibited, including systems that have subliminal techniques likely to cause harm or exploit vulnerabilities due to age, disability or social or economic situation. High-risk AI systems have strict requirements. These are AI systems used as safety components of products or those listed in Annex III of the Act, that could largely impact people's safety or fundamental rights. Obligations for providers of high-risk AI systems include having a risk management system, making sure to have data governance, maintain technical documentation and establish human oversight mechanisms. (European Parliament and Council 2024, 5, 9-14.)

The Act also includes transparency obligations for certain AI systems, like chatbots and deepfakes, to lower the risk of manipulation. Most AI systems are found to be minimal risk and can be

marketed and used under existing legislation without additional legal obligations under the AI Act. General-purpose AI models, capable of performing large amounts of tasks are recognized for their unique risks. The Act gives specific provisions and obligations on these models, with the European Commission's AI Office responsible for enforcement. The AI Act's demands are being implemented in phases, with key milestones including the banning of certain AI practices from February 2025 and the implementation of rules on high-risk AI systems from August 2026. Penalties for non-compliance can reach up to €35 million or 7% of the total worldwide annual turnover, depending on what is the problem. (European Parliament and Council 2024, 15-19.)

The European Union Aviation Safety Agency (EASA) has been involved in integrating digital technologies into cabin crew training programs. In December of 2022, EASA published the "Guidelines on Initial Cabin Crew Training," aiming to standardize the training procedures with different operators and training facilities. These guidelines give a detailed information to facilitate the implementation of regulations and that way ensuring a standardization of the initial cabin crew training. The use of digital training methods goes with EASA's commitment to modernize aviation education while maintaining the strict safety and competency standards. By having these new possibilities, EASA focuses on the possibility to enhance the flexibility and accessibility of cabin crew training programs. (EASA 2022, 1.)

Based on these guidelines, EASA has approved the use of digital learning methods in cabin crew trainings. This approval allows training organizations to conduct parts of their theoretical portion online, needing that the digital content covers the necessary topic in a sufficient way. Topics suitable for online learning include aviation terminology, theory of flight, areas of operation and meteorology. Other topics can be gone through with online digital methods to add to the classroom or practical lessons and that way give the learner a deeper understanding about the topic in question. (Aeroclass 2023, 1.)

The Finnish Transport and Communications Agency (Traficom) is the supervisory authority for aviation training in Finland, including the cabin crew training. While any specific guidelines on the integration of Artificial Intelligence into cabin crew training are not written in Traficom's current publications, the agency emphasizes compliance to already existing safety and competency standards. To obtain a cabin crew attestation, individuals must complete a nine-part initial training course and pass the including examination. Training organizations like Finnair Flight Academy Oy and Nordic Regional Airlines Oy, are authorized to give these attestations in Finland. Traficom helps, guides and audits these organizations to ensure compliance with regulatory requirements. (Traficom 2024, 1.)

In conclusion AI offers a great potential to enhance cabin crew trainings, but it is important to handle the aviation regulatory and ethical challenges carefully. This includes ensuring compliance with safety standards, maintain data integrity, preventing biases and consider the broader outcomes for employment in the industry.

5 Research methods

The material for this thesis was gathered through an online survey distributed to cabin crew members with different levels of experience in training and operational duties. The survey consisted of both quantitative (Likert-scale and multiple-choice) and qualitative (open-ended) questions. The target was to gain insights into perceptions, expectations and concerns regarding the use of artificial intelligence in cabin crew trainings. The first part of the survey was open to all responders and the second part was divided specifically for safety, service and first aid instructors. (see Appendix 1 for full survey form)

Creating a well-designed survey is an important part of making sure the overall quality and reliability of a thesis. A successful survey begins with careful planning during the design phase, that lays the foundation for the validity and reliability of the entire process. The quality of a survey can be significantly improved by paying attention to how questions are structured, how they are presented and how the target group is defined and approached. (Vehkalahti 2019, 42; Denscombe 2014, 13.)

According to Vehkalahti (2019, 40–41), measurement of reliability consists of two essential components: validity, that shows whether the survey measures what it is intended to measure and reliability, that shows to the accuracy and repeatability of the results. Bryman (2016, 163) also notes that threats to validity can arise if questions are ambiguous or poorly aligned with research objectives. To ensure that these criteria’s are met, the survey should be tested before with participants from the intended target group. This helps to verify whether the questions are understood correctly and if they are relevant. (Vehkalahti 2019, 48; Oppenheim 2000, 147.)

Open-ended questions are often included in a survey to gather more detailed answers on specific topics. These responses can be very useful in providing qualitative data and are sometimes included in the final report as direct quotes to show key findings. (Vehkalahti 2019, 47–48.)

A cover letter with the survey plays an important role in motivating the target group to respond. It should clearly show the purpose of the study, who is doing it and why the research is being carried out. This can have a significant effect on the response rate, that in many survey studies happen to remain below 50%. (Vehkalahti 2019, 44,47.) A good cover letter helps build trust and encourages participation.

To improve more the validity and coherence of the questionnaire, feedback can be collected from supervisors or peers who have experience with similar research. Based on this feedback,

adjustments can be made, like refining or removing redundant questions or shortening the survey to increase its effectiveness and improve the response rate. (Bryman 2016, 195.)

In the thesis, artificial intelligence (AI) was used to assist in creating an English language survey and generating ideas for the questions. By leveraging AI tools, it helped to be able to come up with questions that go closely with the research objectives and the target. AI helped to refine the wording of the questions, making sure that they were clear and appropriate for the audience, that is essential for getting accurate and reliable responses. By using AI in the the survey design process, I was able to streamline the development of the survey, improve the quality of the questions and make sure that the final survey goes with the research goals. This way helping with achieving the wanted outcomes. As the topic was about AI, the use of artificial intelligence to work on the survey was natural and gave more good insight of the benefits and many ways of use that it can offer.

5.1 Target

The target for the survey was to collect ideas and opinions from cabin crew instructors about the use of artificial intelligence (AI) in cabin crew training, in more detail in the courses for new entrants. The main goal was to find out how AI could be used to support the teaching process and what kinds of methods could be useful in future training programs. Big part of that is of course the professional motivation to use these kinds of tools and the survey focused also in getting the information about the motivation and attitudes toward artificial intelligence. As technology continues to grow and change many areas of life, AI is also starting to play a bigger role in education and professional training. The aviation industry is not an exception. New ways of learning are becoming more digital and AI offers many possibilities that could help both students and instructors. This survey focused on understanding how AI might fit into cabin crew training, that is a very important part of airline safety and service and could have an effect for training facilities all over the world.

Cabin crew instructors were chosen for the survey because they have a lot of knowledge and experience in cabin crew trainings. They work closely with new cabin crew members and understand what skills and knowledge are needed. Their opinions are so valuable because they know what works well in trainings and what could be improved. They can also help point out any risks or problems that might come with using AI. The instructors of this Finnish airline training center are not working in the biggest possible center in the world and could give good insight with their experience in cabin crew work also.

The survey included questions about how AI could help in areas like safety training, first aid training and customer service training. It also asked about the use of smart learning systems that can adapt to every student's learning style and speed. For example, AI could give instant feedback, track progress and help students practice different situations through simulations or virtual reality.

Another important target of the survey was to understand the level of readiness and interest with the instructors when it comes to using new technologies. The survey found out how comfortable the instructors feel with new digital tools and if they are open to trying new methods in their trainings. It also explored any concerns they might have, like the fear of losing the human touch in training or not having enough support to use AI tools.

The results of the survey can help training centers, airlines and training providers to plan for the future. By understanding the views of instructors, it is possible to design training that uses the best of both worlds like human expertise and smart technology. The aim is not to replace instructors, but to give them new tools that can make training more engaging, flexible and effective. In conclusion, the target of the survey was to see the possibilities of AI in cabin crew trainings by collecting thoughts from those who are already working in the field. The information gathered will support future development of training programs and help prepare the aviation industry for a more digital and innovative learning environments.

5.2 Survey in practice

The survey was made with Webropol platform as it was already familiar to the writer of this thesis and provided an easy platform to make a survey that is very user friendly. Webropol is commonly used for academic and organizational research as it is user friendly and has secure data handling. The survey link was sent to cabin crew instructors through instructor's communication channels and promoted at the office using QR-codes. This allowed the survey to reach the group directly and efficiently. These channels only allowed active cabin crew instructors to answer the survey. Webropol system gave a link and a QR-code to the survey and it was easy to follow the answering rate online for the time the link was active.

The survey was sent to cabin crew instructors who work at a Finnish training center on the third of February. Overall number of instructors who got the survey was 66 instructors, that consist of 36 safety instructors, 14 first aid instructors and 16 service instructors. All the instructors also work as cabin crew members and have years of experiences with the actual work they are teaching.

Out of the 66 instructors, 33 completed the survey and by that resulting in a response rate of 50%. The participants were not required to provide any personal or identifiable information and all responses were submitted anonymously. Participation was voluntary and the results were looked through only by the writer of this thesis. The collected data was used only for the purpose of this academic research and was handled with ethical research guidelines in mind.

The survey remained active for responses for two weeks to allow enough time for the participants to answer when it is a good time for them. Remained was sent after one week and that allowed for more responses. After two weeks the link was closed and no further responses were accepted. At the time of closing the survey, a total of 33 responses had been received. The data was then taken from Webropol for further analysis.

5.3 Analyzing of the material

The data from the survey was analyzed using a combination of quantitative and qualitative methods. The multiple-choice questions were reviewed with basic statistical analysis to identify patterns and percentages. This way helping to understand how common certain views or experiences were among the participants and to support the research questions of the thesis. Thematic analysis was used for the open-ended questions. This method was chosen because it allows to get deeper understanding for participants thoughts and ideas in their own words. The combination of these methods made it possible to form a complete picture of the perspectives of the instructors on the use of artificial intelligence in cabin crew trainings.

All responses were downloaded into Excel and then imported into Google Sheets for organization. Quantitative data was summarized using basic descriptive statistics, like averages, medians and frequency distributions, to identify trends in participant responses. This included measuring the perceived importance of AI in training and the areas where AI integration was considered most useful. Qualitative answers were analyzed using thematic analysis, a method for identifying, analyzing and reporting patterns within the data. Recurring themes were coded manually based on repeated words and ideas. This approach gave a possibility for a deeper understanding of instructor’s attitudes, concerns and proposed applications of AI.

After analysis, the answers were used to provide recommendations for cabin crew training facilities and also to reflect on current limitations and development needs. Thematic categories provided a basis for mapping the results with the existing literature, showing both similarities and gaps. The results supported practical development ideas like hybrid training models, simulation tools and instructor training on AI use. These findings are gone through in the recommendations chapter, by using the data from the survey and the theoretical framework.

After the data was collected and used solely for the academic purposes related to this thesis, all the data was securely stores and accessed only by the writer of this thesis. The data was not shared as it is to anyone else and was made sure already in the survey planning that the identity of the participants was not possible to be noticed via the answers as no personal information was collected. This was to ensure the anonymity and confidentiality. All interpretations and presentations of the data in this thesis are based on theoretical framework and anonymous answers from the survey. The raw data will not be used for any other purpose and will be responsibly deleted after the completion and evaluation of the thesis.

6 Survey results and analysis

The survey reached 33 instructors within the two weeks it was open. Questions 1–8 were mandatory questions for all the participants. In those questions there were 33 answers. Later in the second part of the survey, the participants were asked to answer based on their instructing orientation. Those questions had different number of answers based on the participating instructors and their orientation. In this part of the thesis is the survey results and analysis of the gotten answers. In the end there is deliberation about the success of the survey and development proposals for the future for cabin crew training facilities implementing artificial intelligence to their training programs.

6.1 Answers and analysis

Question 1. How familiar are you with artificial intelligence?

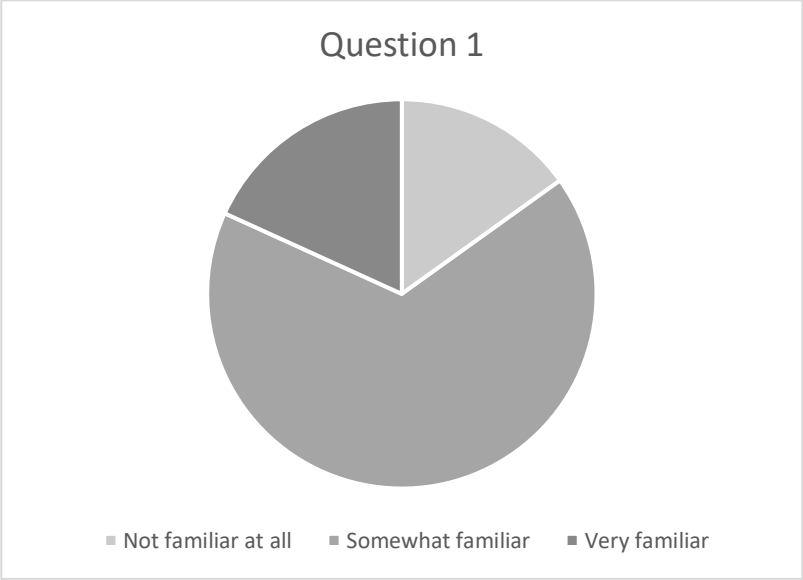

Figure 2. Distribution of familiarity with artificial intelligence

Not familiar at all: 15,1 %

Somewhat familiar: 66,7 %

Very familiar: 18,2 %

Average: 2,0

Median: 2,0

The answers from this question showed that most responders have a moderate level of familiarity with AI. 66,7% of responders were somewhat familiar with AI, indicating that the majority have some knowledge of the topic but are not advanced users. Only 15,1% of people said that they were not familiar at all and 18,2% said that they were very familiar, showing that very few participants are either completely unfamiliar or highly knowledgeable about AI. Overall, this shows that AI is known to the group but there is a wide range of knowledge levels between the responders.

Question 2. Have you ever used AI-based tools in your personal life/ school/ work?

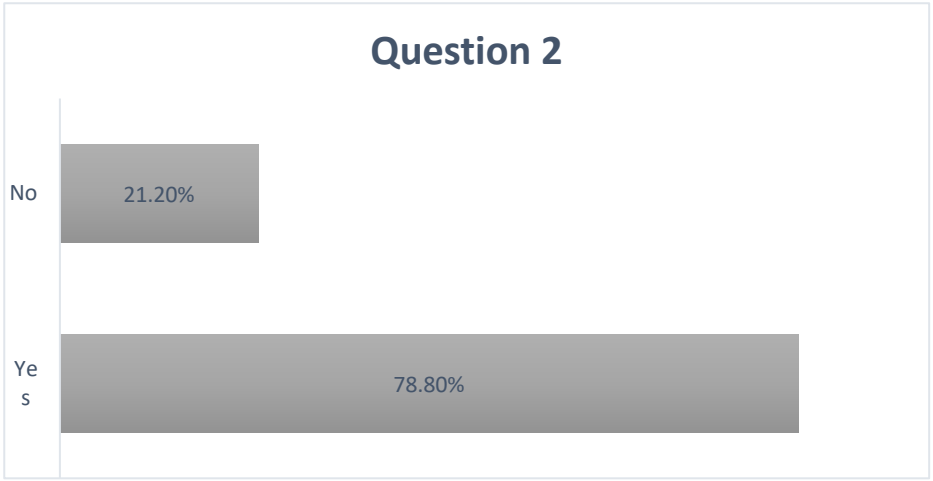

Figure 3. Use of AI-based tools in personal life/ school/ work

Yes: 26 answers, 78,8%

No: 7 answers, 21,2%

This question gives information that most responders had used AI-based tools at least once in their personal life, school or work. 26 responders had used these kinds of tools and 7 responders had not. This question does not specify where these tools have been used or how often. This was just to get an idea about the level of knowledge of the responders and also see the willingness to use these kinds of tools.

Question 3. What is your opinion on integrating AI into cabin crew new entrant training?

1=very negative, 2=somewhat negative, 3= neutral, 4= somewhat positive, 5= very positive.

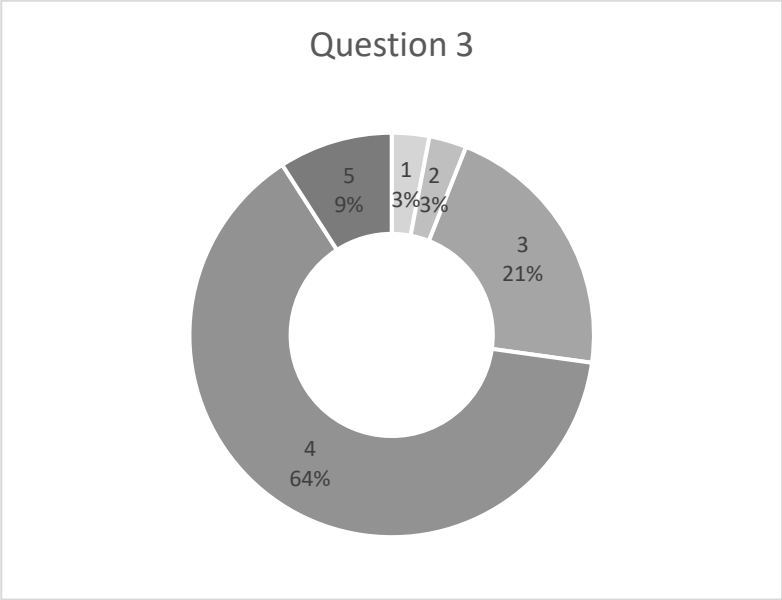

Figure 4. Opinions on integrating AI into cabin crew new entrant training

Very negative: 3%

Somewhat negative: 3 %

Neutral: 21,2 %

Somewhat positive: 63,7 %

Very positive: 9,1 %

Average: 3,7

Median 4,0

These answers show that most of the responders have a somewhat positive view of integrating AI into cabin crew training. 9.1% of responders had a very positive opinion about the topic. On the negative side there were only 3% with somewhat negative and 3% with very negative opinions. A slightly bigger part of the responders (21,2%) were neutral with this subject, indicating that they nether support or oppose the integration of AI. The average score was 3.7, meaning that the overall opinion leans more towards the positive side and scores above 3 typically indicate a favorable response. The median of 4.0 supports the trend as median represents the middle value of the responders.

Question 4. Can you give me examples or experiences that shape your opinion on integrating AI into cabin crew training?

All the answers can be found from appendix 2 at the end of this thesis.

This open-ended question revealed a wide range of thoughts and attitudes with the responders. The answers went from curiosity and openness to skepticism and cautious optimism. Most responders showed a positive or neutral attitude towards the use of AI in cabin crew trainings, even with limited personal experience with it. Many responders mentioned that they have not used Ai a lot in their personal lives but still believe that it could be helpful. This show willingness to use new technologies even without personal experiences.

Many highlight the practical benefits of Ai, like the use for creating training materials, translating, summarizing or reducing repetitive tasks. One responder mentioned how AI helped in planning and creation of recurrent training of 2025 for that airline. Other responders said that AI could help instructors with gathering content and helping with planning of the trainings. Ai could also help to create example scenarios for classroom training use. These responds show that AI could save time and effort, especially in the early stages of lesson planning or content development.

There were ideas that AI can make learning more interesting and motivating. Responders noted that AI could offer new ideas for keeping the students engaged and getting ideas for different teaching methods. Some responders saw a potential in the use of AI in personalization where trainings could adapt to individual learning needs or focus on specific areas students need to improve.

All the responses were not completely positive. A few responses reflect concerns and uncertainty. For example, a responder wondered whether AI can really understand or handle safety and emergency procedures the same way a human expert can. Other pointed out that while AI can help a lot, instructors must be careful and not rely on it blindly. This comes especially with company specific procedures. There were also concerns about the AI generated images and suggestions of the importance of clear labeling in the training materials. Some responders said that AI translations can sound unnatural and that’s why human review is very necessary.

Overall, several responders described their attitude as neutral or cautious. They don’t have strong feelings yet because of the lack of knowledge or use. This shows that education, information and exposure to AI tools could help more people form opinions in an informed way.

There were some recurring themes and similarities with the answers. These were gathered using thematic analysis. This method works for qualitative research data to identify, analyze and then

report patterns or themes within the data. This is helpful in understanding how people are thinking, feeling or experiencing a certain topic. (Nowell, Norris, White & Moules 2017, 2)

1. Openness despite limited experience

Many responders say that they don't have much experience with AI but still show a positive or neutral mindset towards it and its use in trainings. This shows willingness to learn and adapt, that is very important when discussing the future of cabin crew trainings. Personas that are unfamiliar with AI are open to it, meaning that with good introduction and support, Ai integration could be accepted well in the future by instructors.

2. Ai as a support tool – Not a replacement

Many responders describe AI as something that can help with small or repetitive tasks. These include creating materials, gathering content or generating ideas. These are a great use for these tools but clearly the responders note that AI should not replace human expertise, especially in safety related areas. This shows support for the idea that AI can enhance the training process but needs to be used alongside human instructors. This way maintaining the balance between technology and human judgement.

3. Timesaving and efficiency

Many responders believe that AI could save time in planning and reduce workload. Some examples were of using Ai to create backstories or quizzes for trainings. These practical examples give evidence that AI can already improve the efficiency of training design.

4. Ai and motivation/adaptation

Some responses mentioned how AI can help keep lessons interesting by offering varied teaching methods or generate new ideas for engagement. This supports the idea of Ai being creative and learner-centered teaching tool. There is also a shared understanding about the topic that AI use will frow in the future and everyone will need to learn how to use it. This supports the idea that cabin crew training should include more use of Ai and instructors should have basic digital literacy and AI skills.

5. Caution and critical thinking

Some responders showed concerns about AI accuracy, especially in emergency procedures or the realism of AI generated images. Other focused on the need to fact check AI content. This shows a balanced view by acknowledging valid concerns. This shows the need to use Ai critically and not rely on it blindly.

Question 5. How important do you think it is to integrate AI into cabin crew new entrant training program?

1= very unimportant, 2= somewhat unimportant, 3= neutral, 4= somewhat important, 5= very important.

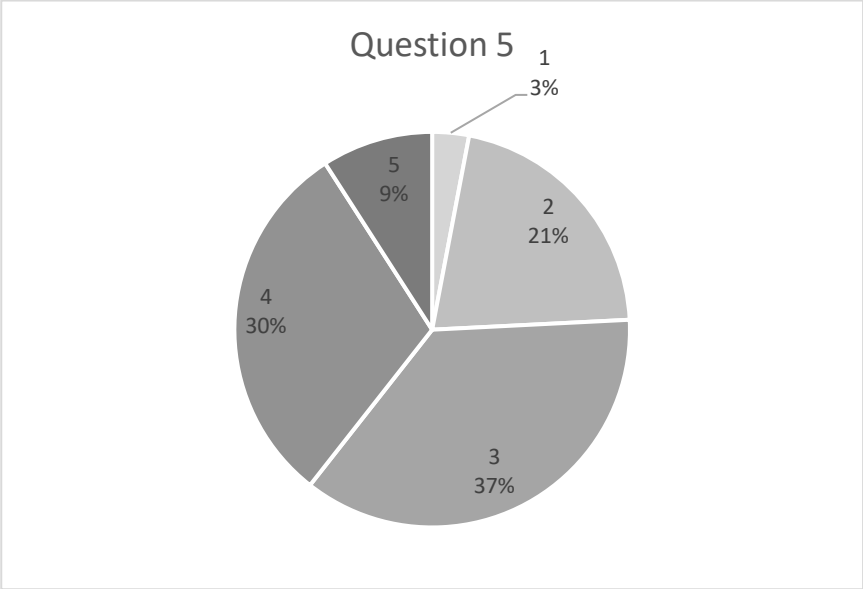

Figure 5. Importance of integrating AI into cabin crew new entrant trainings

Very unimportant: 3%

Somewhat unimportant: 21,2%

Neutral: 36,4%

Somewhat important: 30,3 %

Very important: 9,1 %

Average: 3,2

Median: 3,0

Most responders thought that integrating Ai into cabin crew new entrant training is either somewhat important or neutral. Only a small number of responders thought it was very important (9,1%) or very unimportant (3%). The average score was 3.2 and the median was 3.0, showing that the overall opinions of the responders were quite balanced. These answers show that while there is interest in AI, many responders are still unsure or want to learn more before deciding how important it really is for training cabin crew.

Question 6. With AI you can personalize trainings to suit individual cabin crew members. In what way do you think it could be used and would it be beneficial?

All the answers to this open question can be found from appendix 3 at the end of this thesis.

Many responders had positive or open-minded thoughts about using AI to personalize cabin crew training. A common idea was that AI could be used to track students' test results and highlight difficult areas for each individual. Some felt that AI could help giving feedback or creating personalized training plans based on the learner's needs. For example, one person suggested using AI to build scenario-based training to focus on specific skills like followership. Others mentioned that AI could help instructors by making it easier to create new training materials and ideas.

A few respondents pointed out that even though cabin crew training must follow standard rules and cannot always be personalized, AI could still be useful in the background to support learning styles or provide extra help for those who need it. Some answers also showed curiosity but mentioned needing more information before forming a real opinion. There were also some blank answers or people answering, "I don’t know." Overall, the responses show that not everyone has experience with AI, but many see its potential to support individual learning, save instructors time and create useful tools for training.

Using thematic analysis similarly to the question 4, there were some clear patterns and repeated ideas in these responses. Nex they will be grouped into four themes.

1. Personalization and individual needs

   Many responders mentioned that AI could help tailor training to individual learning needs. These would be tracking test result and identify weak points, give personalized feedback, offer

extra support or additional tasks based on a student's level and adapting trainings to different learning styles.

2. Creating or supporting training materials

Many responders mentioned that AI could be helpful tools for instructor in generating new training ideas, helping to create materials more efficiently and offer scenario based or story-based learning exercises.

3. Feedback and testing

Ai was seen as a useful tool by the responders for giving the student real time or automatic feedback, running test and tracking progress and helping students know where they need to improve.

4. Skepticism and limitations

A smaller group of responders felt that they were unsure or unfamiliar with Ai and needed more information before forming an opinion. Also, some pointed out that safety training must be standardized and too much personalization might not be suitable in a regulated training environment.

Question 7. What are your main concerns regarding the use of AI in cabin crew new entrant training? (Select all that apply)

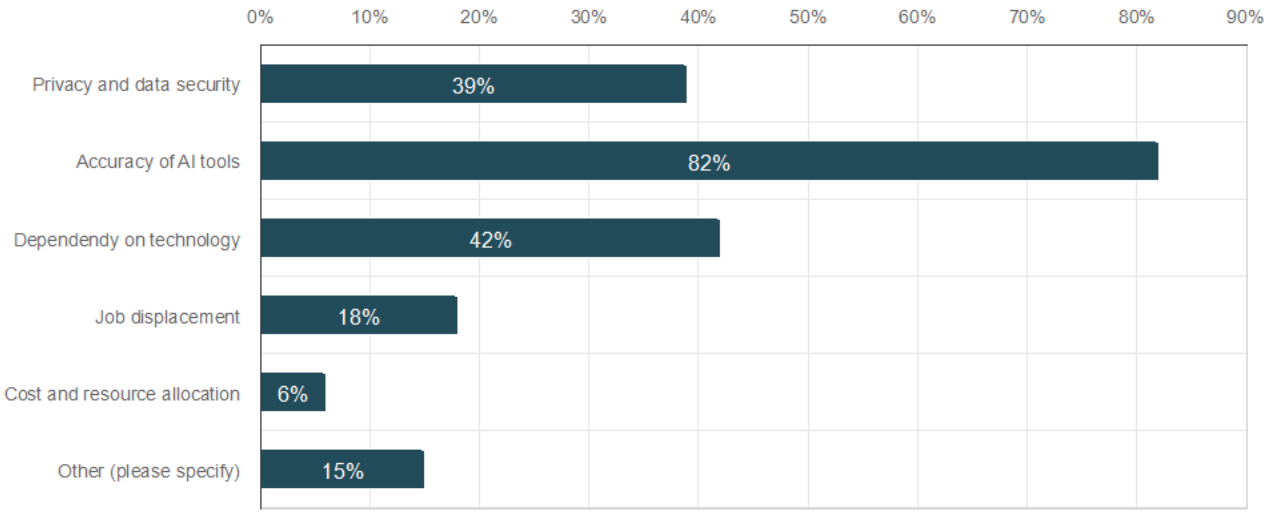

Figure 6. Main concerns about the use of AI

Privacy and data security: 13 answers, 39,4%

Accuracy of AI tools: 27 answers, 81,8 %

Dependency on technology: 14 answers, 42,4 %

Job displacement: 6 answers, 18,2 %

Cost and resource allocation: 2 answers, 6,1 %

Other (Please specify): 5 answers, 15,2 %:

- Misuse
- Sustainability
- How trustworthy it is as a teaching aid? Information security would be one significant part to think about
- Environmental issues
- Overreliance on automation.

When responders were asked about their main concerns related to the use of AI in cabin crew new entrant training, the most common mentioned issue was the accuracy of AI tools, answered by 81.8% of participants. This suggests that most responders are unsure whether AI systems can provide correct and reliable information, that is especially important in safety-critical training like the training for cabin crew members.

The second most common concern was dependency on technology (42.4%), followed by privacy and data security (39.4%). These results show that respondents worry about whether AI works correctly and also about how much we rely on it and if it can handle personal or sensitive data safely.

Other concerns like job displacement (18.2%) and cost or resource allocation (6.1%) were less frequently selected, showing that worries about losing jobs or the costs of using AI are not as important in this specific context.

In the open answers under “Other,” participants brought up additional concerns. This included misuse of AI, overreliance on automation, trustworthiness as a teaching aid and even environmental sustainability. For example, one respondent wrote: *“How trustworthy it is as a teaching aid? Information security would be one significant part to think about.”* Another

mentioned *“environmental issues”*, showing that some responders are considering the broader impacts of AI beyond just the training setting.

Overall, the results show that while respondents are open to the idea of AI in training, they want to be sure that it is reliable and used in the right way. This is showing the realistic concerns professionals have, that is useful when keeping in mind the limitations or challenges of AI integration in training that have been gone through in this thesis earlier.

Question 8. What are the potential risks of using AI in cabin crew training?

All the answers to this open question can be found from appendix 4 at the end of this thesis.

The responses to this open question highlight many recurring concerns and potential risks going with integrating AI into cabin crew trainings. This was themed by using thematic analysis like the other open questions earlier.

1. Inaccurate or misleading information
   One of the most common themes was the risk of inaccurate or misleading information. Multiple responders mentioned the possibility of AI providing *“misinformation,” “weird/inaccurate content,”* or *“wrong or too complicated language.”* Responders noted the importance of fact-checking AI outputs to maintain high training standards. As one responder put it, *“Content creators will have to double-check to make sure all the information is correct.”*

2. Data privacy and handling of confidential information
   Another big topic was data privacy and the handling of confidential information. Concerns were raised about the possibility for AI tools to leak or misuse sensitive company or safety-related data. Comments such as *“data security issues,” “confidential material spreading”* and *“regulatory side and the complexity of the tools”* shows the importance of this issue, especially in a safety-critical and highly regulated field like aviation.

3. Overreliance on technology
   Participants feared that *“liiallinen tuudittautuminen tekoälyn apuun”* (overreliance on AI) could show in a loss of human oversight or critical thinking. Some worried that training might become *“too impersonal”* or that *“our human experiences,”* that are important for interpreting real-world situations, could be overlooked if AI is used too much.

4. Limitations of AI in understanding the nuances of safety and emergency procedures. One responder questioned whether AI can *“give the correct answers”* in real emergency contexts, while another noted that *“safety training also needs to be organized so that humans monitor humans.”* This is very important to have the human oversight and work together with AI-tools to come up with good trainings.

Other less noted, but important concerns included:

- Loss of jobs or human roles in training, *“It might replace individuals and human instructors.”*
- Environmental impact of AI, *“AI is very bad for the environment.”*
- Resource challenges, with that AI might *“take away from traditional teaching practices.”*

In summary, the responses show a strong awareness of the need for accuracy, secure handling of information and having human judgment in the training processes. Since my thesis focuses on AI integration into cabin crew training, hearing directly from cabin crew or training professionals gives my research practical relevance. It’s not just speculating — I now have actual opinions from the field. This supports the validity and **r**elevance of my findings. Understanding these concerns allows me to suggest responsible and good ways to implement AI in trainings. Many responses emphasized the value of human instructors, real experiences and communication. This supports the argument that AI should enhance and not replace human interaction.

In the second part of the survey, the participant was asked to answer questions based on their instructor orientation. Those are safety instructors, first-aid instructors and service instructors. This should have been clearer because of the number of answers in all questions are more than the total number of participants, that means participants answered questions that were for other instructors as well as their own orientation. This does not hinder the results but does not give a clear view of the orientations different kinds of views

Safety instructors were asked the following question.

In which areas of safety training do you see AI being most useful? (select all that apply)

Answers: 23, selected options: 56

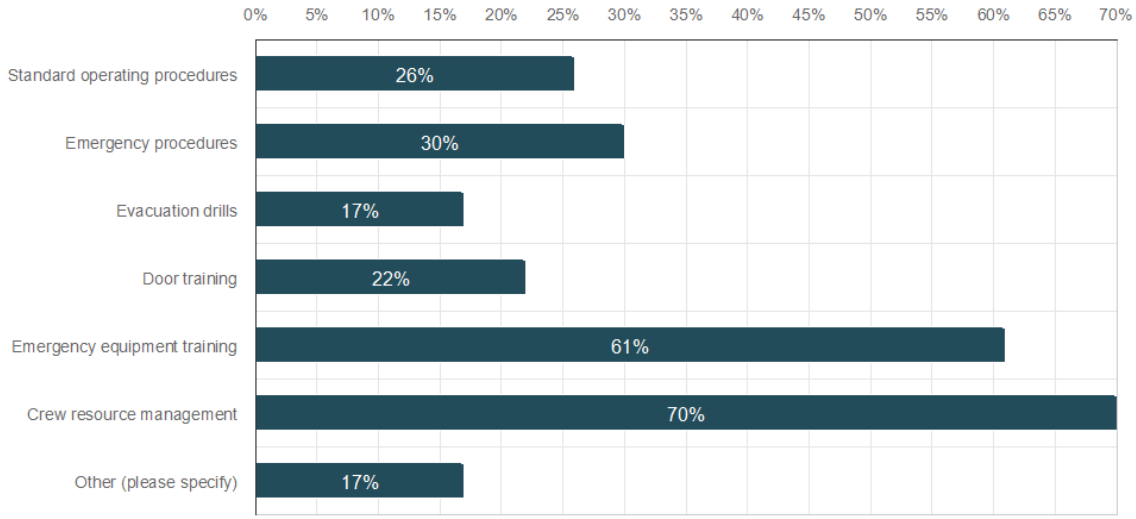

Figure 7. Areas of safety training for the use of AI

Standard operating procedures: 6 answers, 26,1 %

Emergency procedures, 7 answers, 30,4 %

Evacuation drills, 4 answers, 17,4 %

Door training, 5 answers, 21,7 %

emergency equipment training, 14 answers, 60,9 %

Crew resource management, 16, 69,6 %

Other (please specify): 4 answers, 17,4 %:

- service
- Latest data and info recent emergency
- first aid
- I don’t have any idea because this is very new to me

According to these responses, Crew Resource Management (CRM) and Emergency Equipment Training stand out as the areas where AI could be most useful, receiving 69.6% and 60.9% of the answerers. This shows that responders recognize AI’s potential in enhancing teamwork, communication scenarios and in delivering technical content related to safety equipment and procedures. These areas often involve coordination and decision-making, where AI could help create realistic simulations or adaptive learning environments.

Emergency procedures (30.4%), door training (21.7%) and standard operating procedures (26.1%) received good support, indicating that AI might be helpful in standardizing practices or creating virtual walkthroughs for tasks that require focus and repetition.

Evacuation drills received only 17.4% of responses, showing a lower confidence in AI handling physically intensive or emotionally high-stress training areas. This highlights a recurring theme from earlier responses: the need for human involvement in emotionally or physically demanding situations.

The open-ended responses added other insights. For example:

- One responder mentioned first aid, which could suggest the use of AI in interactive learning modules for medical scenarios.
- Another highlighted service, which may reflect the idea that AI could help simulate realistic passenger interactions or customer service challenges.
- The mention of latest data and recent emergencies suggests that AI could help keep training content up to date and reacting quickly to industry developments.

The open question “other” answers first aid and service was given as this was the first question on the second part of the survey. There were later on questions for first aid instructors and service instructors. The answering rate for the questions showed that other than the instructors orientation question was answered. All the instructors work in close cooperation, so the insights of other instructors are also valid for these questions, even though the original plan was to get the insight of the instructors separately based on their orientation.

First aid instructors were asked the following two questions.

Do you believe AI can simulate realistic first aid scenarios for training purposes?

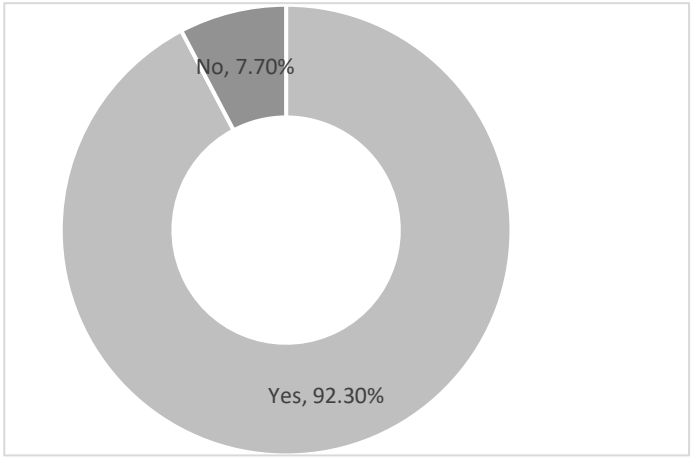

Figure 8. Can Ai simulate realistic first aid scenarios?

Answers:13

Yes: 12 answers, 92,3%

No: 1 answer, 7,7%

This question shows strong support for the potential use of AI in simulating realistic first aid scenarios in cabin crew training. A significant 92.3% of respondents believe that AI can be used for this purpose and only 7.7%disagreed.

These results show that most participants have a positive look on AI's possibilities to enhance first aid training and the possibilities for interactive simulations, instant feedback and scenario-based learning. It goes with earlier findings where participants saw AI as helpful in emergency equipment training and Crew Resource Management, both of that require clear understanding and rapid response in critical situations.

How do you think AI can complement traditional methods in first aid training to improve overall learning?

Answers: 12

1= greatly hinder, 2= somewhat hinder, 3= neutral, 4= somewhat improve, 5= greatly improve

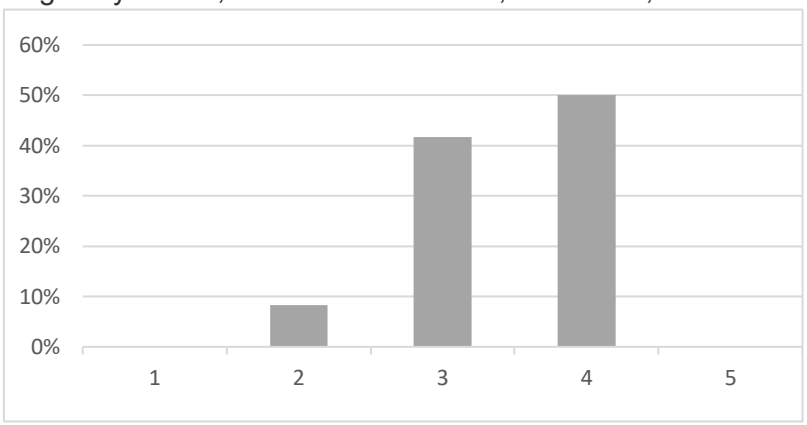

Figure 9. Can AI complement traditional methods in first aid training?

Greatly hinder: 0%

Somewhat hinder: 8,3%

Neutral: 41,7%

Somewhat improve: 50%

Greatly improve: 0%

Average: 3,4

Median: 3,5

The responses to this question show that most participants believe that AI has the potential to complement traditional first aid training methods in a somewhat positive way. Half of the respondents (50%) think AI would somewhat improve the overall learning experience, while 41.7% remains neutral. Only a small group (8.3%) feel it could somewhat hinder learning and no one indicated that it would greatly hinder or greatly improve it.

The average score of 3.4 and median of 3.5 show a cautious optimism and that respondents are open to the idea of AI enhancing training but are still unsure about the extent of its benefits or how it would be implemented in practice. This shows that while traditional hands-on methods are still valued, AI could serve as a useful support tool with interactive scenarios, personalized feedback or tests. These results show support for a blended learning approach, combining the AI-enhanced tools with already existing in-person instructions.

Service instructors were asked the following question.

Which areas of service training could benefit from AI? (Select all that apply)

Answers: 14, chosen options: 41

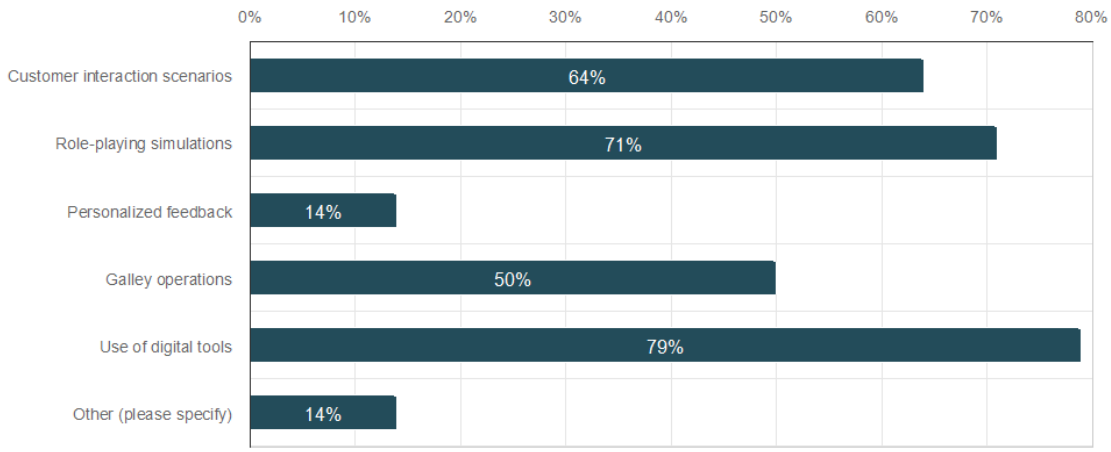

Figure 10. Areas of service training that could use AI.

Customer interaction scenarios: 9 answers, 64,3%

Role-playing simulations: 10 answers, 71,4%

Personalized feedback: 2 answers, 14,3%

Galley operations: 7 answers, 50%

Use of digital tools: 11 answers, 78,6%

Other (please specify): 2 answers, 14,3%

- Aircraft galley equipment operation
- CX related topics

The results show that responders believe that AI could significantly support many aspects of service training for cabin crew. The most frequently selected area was use of digital tools (78.6%), followed closely by role-playing simulations (71.4%) and customer interaction scenarios (64.3%). These responses show a strong interest in interactive and tech-based learning methods, where AI could simulate real-time passenger interactions or provide a virtual environment to practice service-related tasks. Role-playing simulations at the moment done with colleagues might not show the actual possible scenarios and might not challenge the trainees in a good way. Using AI-tools like virtual reality or scenario-based learning could be a good alternative for this.

Galley operations (50%) also received great support, showing that AI could assist in familiarizing new crew members with galley layouts, equipment and processes, possibly through virtual walk-throughs or smart instructions. Personalized feedback (14.3%) received fewer responses, but it still highlights that some participants see value in using AI to adapt training to individual learning styles or areas needing improvement.

The “Other” answers, aircraft galley equipment operation and customer experience (CX) related topics, further point out the potential for AI in technical skill development and enhancing the quality of customer service.

These findings support the idea that AI can enhance service training by making it more immersive, efficient and tailored to real-life situations. This is leading to ultimately improvement of preparedness and confidence among cabin crew trainees.

6.2 Success of the survey

The survey results provided very valuable insight into the current perceptions, expectations and concerns regarding the use of artificial intelligence in cabin crew new entrant training. Overall, the

responses showed a generally positive and open-minded attitude toward AI, even though many participants answered limited personal experiences with it. The success of the survey shows in the wide range of responses collected, both quantitative and qualitative, that allowed a meaningful analysis.

Many responders saw the potential of AI to assist in areas such as training material creation, test feedback and simulation-based learning. Tools like interactive scenarios, role-playing simulations and digital content development were commonly mentioned as opportunities where AI could complement traditional methods. This shows a motivation to explore new ways of learning and teaching, particularly if they can improve on engagement and reduce repetitive tasks.

Concerns like data privacy, information accuracy and overreliance on automation were clearly noted in the answers. These concerns show the importance of thoughtful implementation, where AI is introduced as a supportive tool more than a replacement for human instructors and human interactions.

The survey was successful in achieving its goal of gathering first-hand opinions from professionals in the field. It provided a great collection of viewpoints, including both enthusiasm and caution and these findings now serve as a solid ending for the thesis research. The variety in responses also showed a good level of engagement, suggesting that the topic resonates with these professionals and raises relevant questions for the future of the training programs.

The responders were given enough time to complete the survey and the survey itself was designed in a way that it would not take the responder too much time or need any background information. There were one follow up message sent about the survey and that gave more answers than the first-time message. Answering percentage was 50% that is good for this kind of survey and keeping in mind that not all instructors are at the office all the time and some have flying periods between the instructing work.

One important reflection from the survey process is the need to improve the clarity and targeting of specific questions, particularly in the second part of the survey. It focused more closely on safety, first aid and service training. The first section was open to all participants and gave a valuable general overview of attitudes toward AI, the later questions were intended for a more specialized group like instructors involved in safety, first aid and service trainings. However, it became clear that not all respondents who answered these sections had direct experience in those specific areas, that may have affected the relevance or depth of some responses. All the instructors work closely with each other and in many subjects the orientations are overlapping with each other, is

every instructor does have insight on the other orientations. But in the original plan to get only the exact orientation instructors to answer a specific question was not received. That could have been done to make a mandatory question before the second part of the survey, that what is the responder's orientation and after that reveal the question/questions based on that orientation. That would have limited the answers on the other question and gotten only the relevant data on each question.

For future research, it would be beneficial to include clearer instructions and limitations for each section, guiding responders to answer only the parts that go with their professional background or experience. This would make sure that the responses are more focused and based on relevant expertise and that way leading to more precise data and stronger conclusions for each of the areas.

Despite this, the answers still give useful insights and many participants showed genuine interest and curiosity toward the use of AI with different training areas. By refining the survey structure in future studies, it would be possible to gather even more accurate and specialized data from targeted groups within the cabin crew training professionals.

7 Conclusions, recommendations and reflections

This thesis target was to explore the opportunities and challenges going with the integration of artificial intelligence into cabin crew training programs, with a particular focus on new entrants. Based on theoretical framework and the data from the survey that was conducted among cabin crew instructors, showed that the overall possibilities and attitudes towards its use is cautiously optimistic. The survey data showed that instructors see a potential for AI in supporting content heavy or technical trainings. Participants also raised valid concerns about accuracy, data privacy and overdependence on technology.

Theoretical framework needed a lot of research as the topic as itself is very new and many new innovations come all the time. The framework was collected between the end of the year 2024 and up to April of 2025. Anything after that has not been taken into consideration after April. Multiple topics needed some thinking outside of the box and references from different fields or topic were used to get creditability to the findings. The topics had a lot of articles about possible new technologies that might not be a reality in the future but still show the possibilities of the use of artificial intelligence.

Artificial intelligence was used in this thesis to check text fluency and to get ideas for the structure of the thesis. As a not native English language speaker, checking the text was important so it is clear and understandable. Looking for wide range of sources for the thesis was also supported by Consensus tool. ChatGPT was used to get ideas for the structure of the thesis and DeepL to checking the text. These applications were used responsibly and in consideration of data protection.

7.1 Creditability and ethicality

No personal data was collected in the completion of this survey. Responders participated voluntarily and were not needed to provide any identifying information. The results were handled with confidentiality and stored securely, accessed only by the writer of this thesis. All data was used solely for the purpose of this research and will not be shared with anyone outside of this study. The intentions were to get insights for academic purposes and in accordance with ethical research guidelines.

This thesis was made with consideration for social, educational and environmental sustainability. The research promotes sustainable development by exploring how artificial intelligence can support a more efficient and resource-conscious cabin crew trainings. By finding ways AI can complement traditional training methods, like minimizing unnecessary work for instructors or

trainees and reducing the need for printed materials. This thesis highlight also how technological solutions can contribute to more sustainable training practices. The ethical responsibility of using AI in education has been considered, especially in ensuring human oversight, data security and fair access to learning tools. The thesis also follows the responsible conduct of research guidelines set by Haaga-Helia and respects the well-being of all participants involved in the study.

The responses collected in this study focused on the importance of clear ethical guidelines, privacy considerations and data protection measures. As AI tools begin to handle increasingly sensitive and specialized content like safety-critical information, there is a huge need for aviation training providers to develop clear protocols for how data is collected, stored and used. Research in this area would be valuable to ensure trust and compliance in both national and international aviation stakeholders.

One of the challenges faced in this thesis was the limited number of sources directly related to the use of artificial intelligence in cabin crew trainings. As this is a relatively new field of study, specific research on the topic is low, especially when compared to other more widely used areas of AI applications. This lack of direct academic resources needed a broader approach in gathering supporting literature and drawing conclusions.

To maintain the credibility of the research with the limited direct references, but these were substituted with sources from related fields like education, training and development and other high-technology training environments. This allowed for the forming of relevant theory and practices from those sources while still going with the findings with the specific context of cabin crew trainings.

7.2 Development proposals for the future

Based on the data gathered through the survey and the thematic analysis of open-ended responses, it is clear that there is both interest and cautious optimism towards the integration of artificial intelligence (AI) in cabin crew new entrant training. Participants also expressed concerns related to accuracy, data security and the need for human oversight. Recommendations for implementation must have a balance between innovation and operational safety. Below are concrete recommendations tailored for a cabin crew training facilities to responsibly and effectively integrate AI into their programs.

1. Adopt a Hybrid Training Model

The most promising approach is the development of hybrid training models, where AI complements, but does not replace, traditional instructor-led methods. These models could involve

AI-powered tools for knowledge checks, scenario-based simulations and personalized learning paths, while human instructors continue to deliver physical training, evaluate hands-on practices and provide emotional support. This hybrid model is not only addressing individual learning ways but also ensures that safety-critical content is taught with the seriousness and contextual understanding it requires.

2. Implement Data Privacy and Ethical Protocols

Participants of the survey identified data privacy and misuse of information as major concerns. As a result, it is essential to establish clear data governance protocols. This includes guidelines for how trainees' data is collected, stored and used, as well as the secure handling of company procedures or safety-related content. Instructors and developers must also be made aware of ethical boundaries and the risks of overreliance on automated content. Regular audits of the AI system's contents are necessary to make sure it remains accurate and appropriate for training use.

3. Train Instructors on AI Use and Limitations and critical review process for materials

Instructors play a crucial role in AI adoption. Because of that a mandatory training module on AI tools and their applications in training should be developed for all instructors. This training should include how to use AI for material generation, how to critically review its content and how to integrate it into their teaching without compromising safety, compliance or pedagogical quality. It is also important to train instructors to identify when AI-generated content may be outdated, inaccurate or not aligned with regulatory standards. Before AI-generated content is used in official training, a content validation system must be put in place. Each module or scenario developed by AI should go through a review by qualified subject matter experts to make sure the compliance with internal standards and aviation regulations. This process should be documented and updated regularly to reflect changes in regulation or feedback from trainings.

4. Prioritize AI in Content-Heavy or Simulation-Based Topics

Feedback from responders showed that AI could be most beneficial in areas like crew resource management (CRM), emergency equipment training and emergency procedures. These are topics where trainees often need to process large amounts of information or react to rapidly to evolving scenarios. AI can provide good support by creating interactive learning experiences, personalized development tasks give real-time feedback during simulations. For example, AI could be used to simulate emergency situations through adaptive storytelling, where the trainee's decisions affect the outcome and difficulty level of the exercise. This way showing also the whole picture of the situation and the outcome of all the made decisions.

5. Explore AI-Driven and VR-Based First Aid Simulations

First aid was another area where many participants saw value in AI, especially when combined with virtual reality (VR). A recommendation is to start using AI-supported VR scenarios in safety first aid or service trainings, where trainees can practice assessments, communication and procedures in a realistic but low-risk environment. These simulations can adapt to the learner's pace and choices they make and offer personalized feedback and repetition based on that if needed. These tools could be useful for students who need additional support in some topics or give a possibility to do some parts of the training remotely. These simulations can also give the new cabin crew members the possibility to see what kind of situations might be ahead of them when they start their career and get a glimpse of what the aircraft environment looks like.

6. Maintain Instructor Oversight in Safety-Critical Scenarios

Despite the potentials of AI, responses of the survey highlighted the concern that AI lacks emotional intelligence and situational awareness, that are important in training situations. The recommendation is to make sure that AI remains a supporting tool rather than a lead instructor. A human factor is needed in the trainings to support the trainees emotionally and make the trainings personal. With added AI tools the human instructors can focus more on the relevant tasks at hand and bring their own unique insights and experience to the trainings. The survey showed that especially this is needed in modules related to evacuation drills, door training and security procedures, a certified instructor should always be present to guide, assess and intervene if necessary.

7.3 Need for further research or development

This thesis went through the potential integration of artificial intelligence into cabin crew trainings, focusing on safety, first aid and service trainings. While the findings from the survey show a generally open and curious attitude that cabin crew instructors have toward the use of AI in training environments, the answers also highlighted several areas where further research and development could be beneficial.

It became clear that more research is needed to understand how AI can be integrated effectively into the highly regulated environment of aviation training. Although many responders identified potential benefits like content generation, simulations of emergency scenarios and the ability to personalize the training to individual learning styles, there were also big concerns on the accuracy of AI-generated materials and the risks of deviating from approved and standardized training content. Future studies should therefore focus on the testing of AI applications in controlled pilot

programs within the aviation industry. These trials could help assess the actual effectiveness of AI-assisted learning in terms of knowledge, training efficiency and the overall learning experience for cabin crew members. This would show actual data for the success of these tools and not just the potential possibilities.

The findings also show a need for the further development of AI tools that are specifically designed for use in aviation trainings. Many of the AI tools currently available are general-purpose applications and there is a lack of AI-based solutions built around the specific needs of cabin crew instructors and trainees. For example, virtual reality-based simulations, interactive crew resource management modules or AI-driven feedback systems tailored to the standards of commercial airlines could be developed and tested. These kinds of tools would need to be created in close collaboration with training developers, airline safety departments and regulatory agencies to ensure both compliance with regulations and practical value.

Another important area for development is the wider inclusion of different stakeholder perspectives. While this study focused on the thoughts of instructors, future research should also consider the views of cabin crew trainees, airline management, safety regulators and IT developers. A multi-stakeholder approach would provide a more comprehensive understanding of the opportunities and the limitations going with the use of AI in cabin crew training environments. It could also help to identify the kind of support, guidelines and resources that are needed for successful implementation on a bigger scale.

The long-term impact of AI integration in cabin crew training remains as an open question. More studies could give valuable insights into how AI-based training solutions affect learning, instructor workload, cost efficiency and compliance over time. These studies could also help to track how AI tools evolve with the new safety and service trends in the aviation industry. Also, how they can support the ongoing development and scalability of sustainable, high-quality training programs.

In summary, while this study provided valuable initial insights, further research and development is needed in order to responsibly and effectively integrate AI into cabin crew trainings. This includes technical development, more research, stakeholder involvement and ethical considerations. Continued exploration in these areas will help to make sure that AI supports and not replaces the human expertise and interpersonal elements that are important to high-quality cabin crew trainings.

7.4 Own work and thesis evaluation

This thesis was made independently and focuses on seeing how artificial intelligence could be useful in cabin crew trainings in areas like safety, first aid and service. The process included

reviewing literature, planning and building a survey, collecting responses, analyzing the results and making practical recommendations based on the findings.

From the beginning, the target was to create a thesis that would not only meet the academic standards but also provide real value for training professionals in aviation. The research questions were based on current developments in training and the growing interest in how technology and particularly AI could support learning. Supported also by the writer’s own interest in the topic as someone who has worked in aviation for 11 years in different positions.

The survey was sent to 66 instructors and 33 responded. While this gave a strong base for analysis, a larger number of responses would have given an even clearer view. One area for improvement was that the second part of the survey should have had clearer instructions as some questions were meant only for specific types of instructors (safety, first aid or service), but this was not fully clear to all participants. This is something that could be made in a better way in future research.

To analyze the open-ended questions thematic analysis approach was used. This involved carefully reading the responses and identifying recurring themes or ideas. This method helped to make sense of participants' thoughts in a structured way and gave more insights than just looking at numbers. Open ended questions give the possibility to get good ideas and comments, but the survey maker cannot control what the outcome is. In the end answer were good and gave a lot of information about the insights and thoughts of the instructors, but more answers to these would have also given more to the survey results. Combining open and closed questions gave a wider understanding of how instructors viewed the possibilities of AI in trainings.

Throughout the process, it was possible to stay on track with the original thesis plan and timeline, that helped with keeping the work focused and organized. Setting clear checkpoints and managing the project step-by-step was important for staying within the schedule and making consistent progress. Thesis was done alongside fulltime working hours, so planning was in a key role in the making of the thesis. Working in the same field as the thesis topic still supported the work and offered possibilities for professional growth as well.

One of the challenges was that there is still little amount of academic research focused specifically on AI in cabin crew trainings. Because of this, there were used a variety of sources from general education and AI literature to support the results. This needed some thinking outside the box and doing a lot of research for sources to use for this specific topic. These still gave a strong foundation for connecting theory with practice.

Doing the thesis gave the possibility strengthen skills in planning research, analyzing both qualitative and quantitative data and writing academic text. It also gave the possibility to gain a deeper insight into how cabin crew instructors see the future of trainings, the benefits of AI and the concerns that still need to be addressed. Even though the thesis was done alongside fulltime working hours, it gave the possibility for professional growth and time management skills.

There is always room to improve like in testing AI tools directly in a training settings, but the thesis successfully met its goals. It offers useful perspective for training facilities and supports the responsible and thoughtful introduction of artificial intelligence in the cabin crew trainings. Overall, the research questions of the thesis were well supported by the data that was collected and the results of the survey helped to form concrete development ideas and future recommendations for the cabin crew trainings.

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Appendices

Appendix 1. Survey

Survey for cabin crew instructors

☐ Pakolliset kysymykset merkitty tähdellä (*)

Dear Instructors,
Thank you for participating in this survey on the use of Artificial Intelligence in cabin crew training. Your insights and experiences are invaluable in helping to understand how AI could enhance and support cabin crew training programs. This survey aims to gather your perspectives on the potential benefits, challenges, and applications of AI across various areas of cabin crew training, including safety, first aid, and service training on the new entrant course.
The survey should take approximately 5 minutes to complete. Your responses will remain anonymous and will be used solely for the purpose of this thesis research. I appreciate your open and thoughtful feedback. If you have any questions or need further assistance, please do not hesitate to reach out.
Thank you once again for your time and participation.
Best regards,
Ella Jussila

Your feelings concerning the use of AI:

1. How familiar are you with artificial intelligence? *

	Not familiar at all	Somewhat familiar	Very familiar
	○	○	○

2. Have you ever used AI-based tools in your personal life/ school/ work? *

○ Yes
○ No

3. What is your opinion on integrating AI into cabin crew new entrant training?

1=very negative, 2=somewhat negative, 3= neutral, 4= somewhat positive, 5= very positive. *

	1	2	3	4	5
	○	○	○	○	○

4. Can you give examples or experiences that shape your opinion on integrating AI into cabin crew training? *

5. How important do you think it is to integrate AI into cabin crew new entrant training program?

1= very unimportant, 2= somewhat unimportant, 3= neutral, 4= somewhat important, 5= very important. *

	1	2	3	4	5
	○	○	○	○	○

6. With AI you can personalize trainings to suit individual cabin crew members. In what way do you think it could be used and would it be beneficial? *

Risks in the use of AI in trainings.

7. What are your main concerns regarding the use of AI in cabin crew new entrant training? (Select all that apply) *

- ☐ Privacy and data security
- ☐ Accuracy of AI tools
- ☐ Dependendy on technology
- ☐ Job displacement
- ☐ Cost and resource allocation

☐ Other (please specify) _____

8. What are the potential risks of using AI in cabin crew training? *

_____
_____
_____
_____
_____

Please answer the next questions based on the instructor orientation.

Safety instructors:

9. In which areas of safety training do you see AI being most useful? (select all that apply)

☐ Standard operating procedures
☐ Emergency procedures
☐ Evacuation drills
☐ Door training
☐ Emergency equipment training
☐ Crew resource management
☐ Other (please specify) _____

First aid instructors:

10. Do you believe AI can simulate realistic first aid scenarios for training purposes?

◯ Yes
◯ No

11. How do you think AI can complement traditional methods in first aid training to improve overall learning?

1= greatly hinder, 2= somewhat hinder, 3= neutral, 4= somewhat improve, 5= greatly improve

	1	2	3	4	5
	○	○	○	○	○

Service instructors:

12. Which areas of service training could benefit from AI? (Select all that apply)

- ☐ Customer interaction scenarios
- ☐ Role-playing simulations
- ☐ Personalized feedback
- ☐ Galley operations
- ☐ Use of digital tools
- ☐ Other (please specify) _____

Thank you for taking the time to answer this survey and helping me in my thesis project. I greatly appreciate your input and willingness to contribute to this survey. If you have any additional thoughts or suggestions, please feel free to share them with me via e-mail.

Warm regards,
Ella
ella.jussila1@gmail.com

Appendix 2. Answers to question 4 of the survey

- have no experiences with ai but quite positive mindset towards it
- Using it to get ideas and help in smaller tasks is great. It can help to reduce repetitive tasks at work.
- I think it can be used as a good tool and the fact is that it will be part of the everyday work in the future.
- Maybe I still have some doubts/uneasy feelings about AI as such, regardless of the fact I use AI (prompting & gathering information) on a regular basis. I suppose my opinion depends on the extent to which or the way in which AI would be used.
- Practical tool but not the answer to everything
- I don’ t use AI myself, but I could imagine it would be somehow useful in cabin training.
- The ai can create thoughts one didn’t think of.
- AI is the future, we all must learn to utilize IT, not just mee entrant
- Sieltä voisi saada hyviä uusia ideoita oppilaiden motivointiin tunnin aikana, niin että tunti pysyisi mielenkiintoisena käyttäen erilaisia opetusmenetelmiä
- I have no examples about the subject since my knowledge about it is limited. But happy to try any new things!
- Cannot really specify.
- I think AI could help for doing the materials and exercises for the Cabin Crew training.
- Generally for example AI images irritate me a bit and I know some people share the opinion. It could be because we see a fake image and we think it tries to mimic something even if it doesn't say anywhere that the image would try to look real. If it's used in training contect, better make sure to clearly state that this is an AI image. Building material AI might be a useful tool for gathering information and why not to use it to create text to some extent too if it's necessary. I still feel that it's not completely necessary or I cannot find many good reasons for it to be used.
- Translations, summaries. Also the usagimimi of the company own AI.
- Sometimes when using AI for translating written textes the language AI uses is not suitable for everyday use
- It can be very specific and can explain things clearly. It can collect a lot of data, only to have responsibility on human to fact check data that will be used.
- Machine based learning possibilities, handling information for instructors, helping with material gathering
- Example case scenarios in initial training. Also I am a bit sceptical about it.
- Van check grannar, assist in cretaing training materials

- We have used AI as a help tool with the planning and creation of the Recurrent Training 2025. AI has created backstories, and facilitating questions to them.
- With my knowledge just wondering that hopefully is not too black/white
- No experience but does AI know exactly the safety and emergency/ security situations and therefore give the correct answers?
- VR glasses and different scenarios
- AI could be used more widely especially in e-learning materials.
- Little bit unfamiliar still with AI but feel like it could help with repetitive tasks
- I don’t really have much experience in this regard, but I have seen how quickly things like ChatGPT have developed and improved. I can see the value of more focused training based on programmes that are more specifically focused on individualized development areas for the student, and maybe AI can help with this.
- I think AI is useful and I have recently learnt how to use it. Therefore I’m quite neutral
- I have used it when planning training.
- It can help to reduce time consuming tasks, planning, etc.
- I do not have examples at the moment.
- If used carefully, it can be a valuable resource to an instructor in planning and creating training content. On the other hand AI cannot be familiar with for example company related procedures. When using AI instructor should be critical about the AI generated material on not rely too much on it.
- I feel the use of ai will only increase and will definitely be a part of everyday life in the future. So should be also used in trainings more.
- I am not familiar at all with AI but I am sure it could be very helpful in training. I just need A lot of practice with it!

Appendix 3. Answers to question 6 of the survey.

This was an open question and these answers were gathered:

- tracking the test results and seeing what is a difficult subject for students.
- feedback and tests
- I think it would be beneficial in training scenarios and personalized feedback. It could make individual training programs with the needs of the student in mind.
- People have individual ways of learning but in safety critical field of work, certain things just need to be learned. I have found trainings in the past quite effective and diverse so I don't really see the immediate need or huge benefits of AI for training itself. Maybe it would ease off the workload of people designing the training.
- I don't know
- Separating different approaches to the training could bring valid points of training to each individual more efficiently.
- In the beginning most important thing is that one is not afraid on using AI
- Tekoäly voisi auttaa kohdentamaan opetusta yksilöllisesti, esim. tilanteessa, jossa oppilas tarvitsee tukiopetusta
- Maybe. Sounds interesting buy I need to learn more about it.
- Maybe some additional training according to the needs of a student.
- It could create New ideas for trainings, so I think it would be beneficial to use.
- Maybe to create interactive stories to see how far the student is and what is the competence level. Then with the help of AI we could deepen the knowledge for those who are that far and to keep repeating the basics for those who need more practice.
- Usage of the company AI for searching info.
- No examples
- We all have different ways of learning, with AI we can take into account different learning methods
- I'm not that familiar with the AI's possible benefits in training use.
- Useful for creating training programs specified for initial or operator standards. Perhaps good with ideas
- Safety trainings are never tailored for individual needs, but are regulated in company manuals. Therefore making the trainings individual is not needed, but AI can be used as a tool to help create training contents.
- Scenarios that are difficult to create in training for example different evacuation or emergency situations
- No idea 🤔
- Sounds innovative and modern!

- These individual trainings would be beneficial e.g. to CLP and CPU participants.
- Feedback, tests
- It would be great to develop some sort of online scenario-based trainings that is specifically focused on any identified development areas for the specific student. For example, if the student struggles with good followership, then the trainings could generate scenarios where that element is particularly focused on.
- It would be useful when planning trainings because it can offer different kind of ideas and methods.
- At least helping to create a new training material.
- Since I don’t have that much experience of using AI, I would need more information how to utilize it in training.
- It might support different learners to understand the learning content, but on the other hand cabin training should be standardized and individual tailoring might not be the best option.
- Giving feedback, tracking test scores and noticing shortcomings
- I’m sure it would be beneficial but have no idea How to do that or use it.

in addition there were three blank answers.

Appendix 4. Answers to question 8 of the survey.

This was an open question, and the following 33 answers were gathered:

- The need of a lot of investment and taking away from traditional teaching practices
- not following all the regulations and spreading of confidential material
- finding the best suitable tools that work for the right things and dependency on a lot of technology.
- Weird/inaccurate content.
- AI focusing on wrong elements.
- Some kind of misuse to do things easier than required…
- Misinformation
- I do not see Any risks
- Vastaus ylempänä kohdassa other. Myös liiallinen tuudittautuminen tekoälyn apuun voi pidemmän päälle aiheuttaa ongelmia, joita tässä vaiheessa on vaikea tunnistaa.
- Don’t know really.
- Too impersonal training, no human contact or evaluation. data accuracy, especially in safety.
- It might replace individuals and human instructors.
- If it's noticeable, the students might find it fake/not real and they might not pay attention to the training anymore.
- Wrong words, too complicated language
- Data security issues. Also AI is very bad for environment.
- Fact checking.
- Risk that confidential information is leaked to ones it’s not indented to. Lack of own thinking and learning
- Fact check. How can we monitor and control the accuracy of the AI.
- Generalizing, we need to check facts
- Content creators will have to double check to make sure all the information is correct.
- Needs to make sure that its information is accuracy
- No experience but does AI know exactly the safety and emergency/ security situations and therefore give the correct answers?
- I am sorry this I really don’t know…
- AI is a great tool, but the software needs to be flawless. Safety training also needs to be organized so that humans monitor humans (for both errors and misuse).
- Lack of instructor training, not accurate

- Over reliance on allowing the AI to shape trainings. Sometimes our human experiences is the thing that gives us the insight.
- I think AI is very useful in private or work-related matters but I’m not sure if it can be used for cabin crew training since lot of it private and quite safety and security related.
- Confidential material spreading.
- Data security on safety trainings
- The risk would be incorrect information.
- Confidential material cannot (in my understanding) be used with AI. There is always the risk of overreliance on automation and not using "human brain".
- Regulatory side and the complexity of the tools
- It gives” wrong” information which is not relevant or even accurate at this airline