



AirBooks

Interactive digital learning

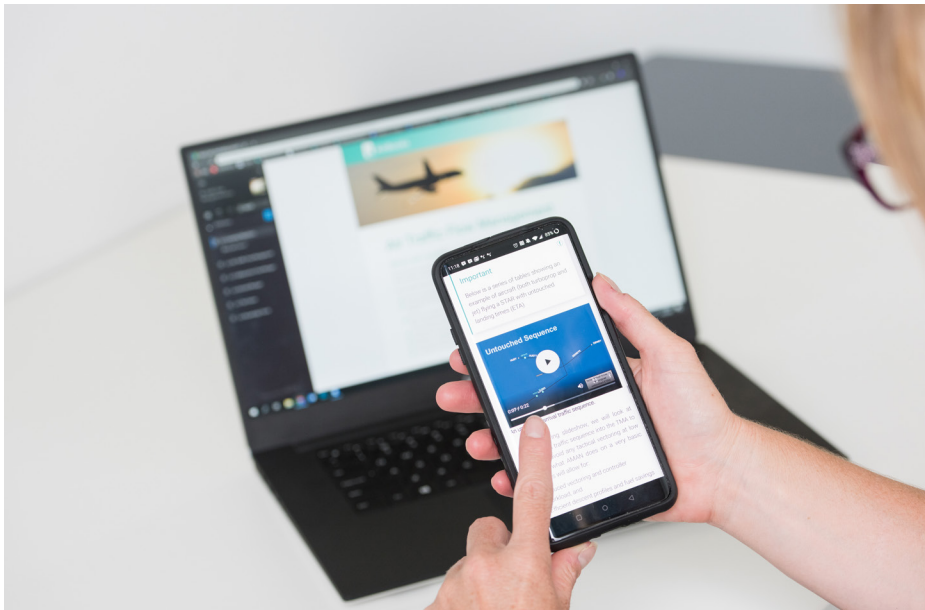


Assessing the application of e-learning in ATC training

Executive summary

From October 2019 to February 2020, a group of more than 300 participants representing 10 air navigation service providers (ANSPs) across Asia Pacific participated in a digital collaboration project with Airways New Zealand.

The project gave participating ANSPs the opportunity to trial and evaluate Airways' AirBooks digital learning platform — experiencing a digital learning environment at no cost, and providing feedback on the effectiveness of e-learning tools for the ATC industry and the potential for future collaboration.



This collaboration between Airways and the CANSO Asia Pacific CEO Committee (APC3) was aligned with APC3 collaboration objectives and in response to specific members' challenges around keeping pace with technology, achieving better training outcomes and fulfilling compliance requirements.

Feedback was gathered at a number of stages throughout the project via targeted surveys. This information, and the analytics gathered from the use of AirBooks helped validate our current understanding of e-learning in the ATC industry, and provided new insights and invaluable access to qualitative feedback from a large pool of participants.

The overall project was a success with high levels of engagement in the digital learning platform and high response rates to the distributed survey.

Insights gathered from the project, and from industry research Airways has gathered over five years, found that participating ANSPs faced similar challenges in training delivery, and that digital learning tools such as AirBooks have the potential to alleviate these issues.

Airways thanks all CANSO participants for their participation in this project — we hope that the findings and subsequent collaboration opportunities are of value.

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Research insights into digital learning

The Airways digital learning team has spent the past five years undertaking detailed research into a range of areas relating to the potential of digital learning in the air traffic control (ATC) industry. This research has covered the effectiveness of new delivery tools, the impact of gamification on refining practical skills and the viability of such new technologies in an industry where safety is paramount.

This research covered the following key areas:

E-learning for organisational training

A number of modern digital learning technologies were analysed as part of our research, all of which had the following as a minimum: available on multiple devices; cloud based; interactive with a range of multimedia; able to integrate with other systems using modern APIs; and supported cloud-based analytics monitoring. Here's what we found:

Learner expectations are different

The next generation of learners have different needs and expectations in terms of how they receive content and training. This new age of learner has grown up with instant, easy access to technology, information and content, and thus their expectations and needs associated with training delivery are different.

When it comes to learning and study, these Millennial and Generation-Z learners expect information at their fingertips, where they need it, when they need and how they need it.

Cost-effective and sustainable

Our research found that e-learning is cost-effective compared to traditional forms of learning — the cost of training is reduced with less time and budget spent on travel and accommodation. It is also environmentally friendly, with far less reliance on paper-based learning materials when using digital devices.

Enhanced engagement and retention of information

Research suggests that e-learning can improve engagement levels and information retention. With training more accessible through the availability of content on multiple platforms at any time, students are able to learn in shorter, targeted periods of time — which positively impacts learning and the retention and recall of information.

There is also a positive correlation between student engagement levels and information retention. By utilising digital media such as quizzes, video and games, modern e-learning tools allow us to target engagement much more effectively.

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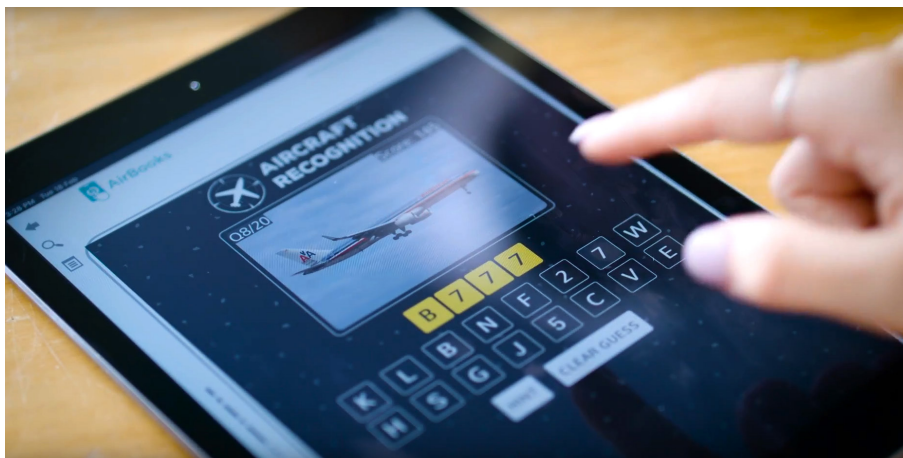
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E-learning in the ATC industry

Airways’ research to understand the needs of millennial learners and the potential of e-learning in the ATC industry has involved a number of discovery interviews with peers through events such as World ATM Congress and ATC Global, and research projects such as this one.

Themes

During our research we have found an alignment in the industry in a number of areas:

- ▶ Many organisations are currently providing some form of e-learning in a more traditional capacity (LMS systems with uploaded PDF and PPT files)
- ▶ Traditional classroom-based, instructor-led training is the most prominent form of training
- ▶ There is a desire to embrace more expansive digital training, however it is widely perceived as a significant step to take.

These themes suggest that ANSPs are gradually moving to more digital based learning, albeit at a slow pace.

Traditional methods such as face-to-face and classroom-based training remain the primary methods of learning around the world for ANSPs. For many, the transition into blended or fully online learning is still to be progressed.

Challenges and pain points

We found that the pain points experienced through traditional means of training delivery appear to be relatively consistent across the industry. These include:

- ▶ Difficulty for learners to get time off the roster
- ▶ Meeting student expectations
- ▶ Maintaining consistent and reliable information, i.e. a single source of the truth.

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CANSO digital learning project

The aim of the CANSO digital learning project was to build on Airways’ current understanding of the potential for digital learning tools to support the ATC industry’s mission to improve global air transport safety and efficiency, through high standards of training and competency of aviation personnel.

By undertaking a collaborative digital learning project, participating ANSPs benefited by:

- ▶ experiencing a digital learning environment at no cost
- ▶ obtaining feedback on the effectiveness of the digital training tools made available as part of the project
- ▶ reviewing the results on the training outcomes achieved
- ▶ informing their decision making on future collaboration models.

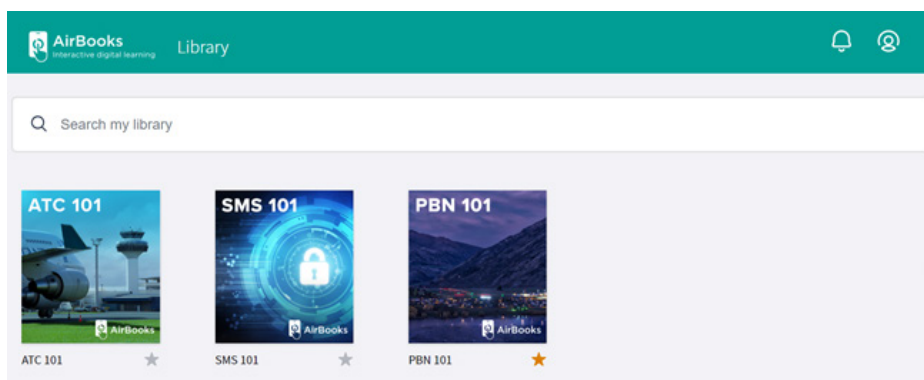
Digital learning tools

As part of this research project, each participating ANSP identified a number of candidates from a range of departments within their organisations to be added to the AirBooks CANSO project library. Each participating organisation also designated a representative to be provided with access to the AirBooks analytics dashboard so they could monitor and manage the progress of their staff throughout the trial.

AirBooks library

AirBooks is a digital, interactive learning platform, designed to enable fast, flexible, engaging, mobile training content available on demand to ANSPs and their staff. AirBooks delivers cloud-based training content to a wide range of devices utilising digitised content such as videos, games, quizzes and animations to improve training outcomes and enable self-directed learning.

The CANSO project library was specifically developed to provide participants with sample AirBook titles, each with a targeted use case. All participants were asked to complete at least one of the three Airbooks made available to them during the project, so they could evaluate the tool and we could measure their usage and performance against the training outcomes.



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ATC 101 – Induction Training

ATC 101 is an introduction to the air traffic control industry targeted at new staff who do not necessarily come from an aviation background. AirBooks as a tool can alleviate some of the challenges associated with distributing induction training and monitoring completion for new staff, through easy to setup distribution rules, course bundling and the analytics dashboard.

SMS 101 – Compliance Training

SMS 101 is an introduction to Safety Management Systems and is an example of compliance content that is ICAO aligned which can be modified or used to supplement your own organisation specific content. AirBooks can be updated and authored online and any changes can be published to all of your staff with the push of a button, ensuring that everyone has access to the most up to date and relevant information.

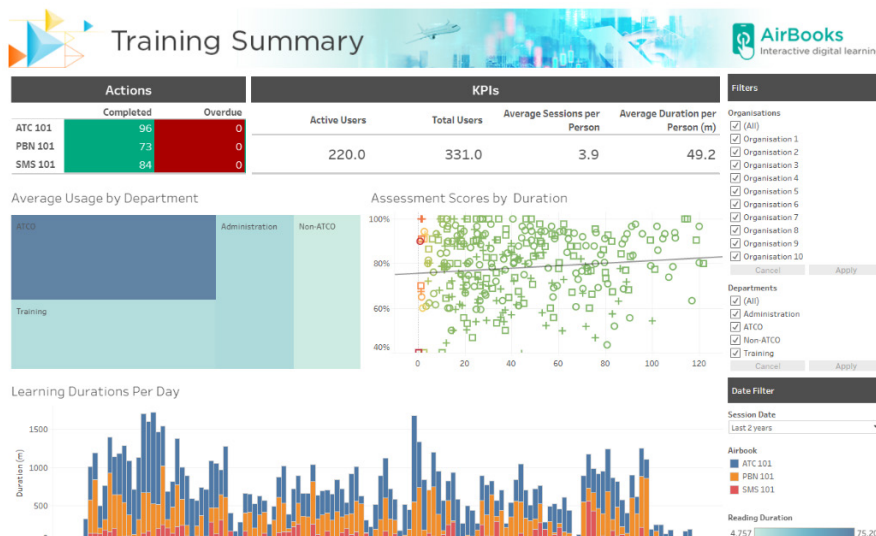
PBN 101 – Operational Training

PBN 101 is an introduction to Performance Based Navigation, an AirBook targeted at operational ATC staff and designed to be a way to deliver the base knowledge required prior to beginning simulator-based training. By delivering training directly to operational ATCs online there is potential for increasing training flexibility and cost effectiveness, with less disruption to the roster.

AirBooks analytics dashboard

The AirBooks analytics dashboard is a cloud-based monitoring tool made available to course administrators to monitor the progress of their staff. This custom dashboard was created to display relevant information based on the desired outcomes of the project and the learnings from the initial survey. Distributed to the participating organisations, the dashboard consists of three main views:

- ▶ **Training Summary** – An overall view of the project showing high level, collated information of all participating organisations
- ▶ **Enrolments Dashboard** – An organisation specific view where each designated course administrator can see which staff have started or completed their AirBooks and some usage statistics
- ▶ **Assessments** – Another organisation specific view displaying course assessment results for participants.



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Organisational pre-survey

Prior to distributing the AirBooks and dashboard, a representative from each organisation was asked to complete an initial survey, so we could understand how ANSPs currently deliver training and the pain points they are currently working to resolve.

From this survey, we found that the majority of organisations train over 100+ employees annually; most organisations have an even distribution of training across ATC refresher, ATM, compliance and induction; training courses are mostly 1-5 days in duration; and classroom based training was the most common delivery.



Challenges and pain points

Understanding organisations' pain points is important so we can utilise technology to provide new tools and platforms that aim to alleviate these issues. It also helps us establish an evaluation criterion for the tools being assessed as part of this project.

In the organisational pre-survey for this project, the key pain points indicated were:

- ▶ Disruption to operational rosters
- ▶ Availability of training resources e.g. instructors and assessors
- ▶ Engagement of staff
- ▶ Location of training providers.

The pain points above are in line with our initial understanding of the industry currently. They are reflective of a traditional training delivery model, one that stands the most to gain from the adoption of digital training tools.

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Project findings and analytics

Results summary

Throughout the project we monitored participants’ engagement through the AirBooks analytics dashboard. This dashboard was used to decide the most appropriate times to issue reminder communications, as well as engage with the organisational representatives who were granted their own dashboard access.

We were very encouraged by the overall engagement results from the group, and also with the feedback summarised below. At a high level the participation summary showed:



Key Performance Indicators

The analytics dashboard allowed us to define KPIs to specifically measure against the pain point of staff engagement, which was outlined in the initial survey. To gain a measure on this we wanted to find out:

- ▶ Of the total group, how many people are using the AirBooks?
- ▶ How many times are they coming back to use AirBooks?
- ▶ How long are they spending in the AirBooks?

Below is a screenshot of the KPIs from the training summary dashboard:

KPIs			
Active Users	Total Users	Average Sessions per Person	Average Duration per Person (m)
220.0	331.0	4.0	49.4

The above results told us that:

- ▶ Initial adoption was high at 66.5% – a considerable amount considering this was not required/regulatory training.
- ▶ On average users came back to use AirBooks on four separate occasions. This is encouraging in validating the potential of AirBooks to enable “bite-sized” learning which improves retention and recollection of information.
- ▶ On average each user spent almost 50 minutes engaging in AirBooks. This is again encouraging, as two of the three courses made available had an estimated duration of 30 minutes and only one AirBook was required to be completed as part of the study. Measuring learning durations can tell us useful information about the engagement levels of our courses.

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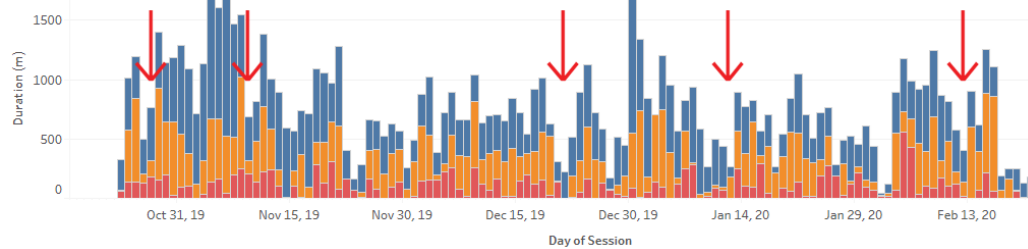
More data insights

Due to the granularity in our data, we can categorise and compare multiple data measures to provide additional insights into the project group.

User engagement over time

Throughout the duration of the project, we gathered a daily usage total for each AirBook as a way of tracking user engagement day by day, and to inform our support team on the best times to initiate reminder emails.

Learning Durations Per Day



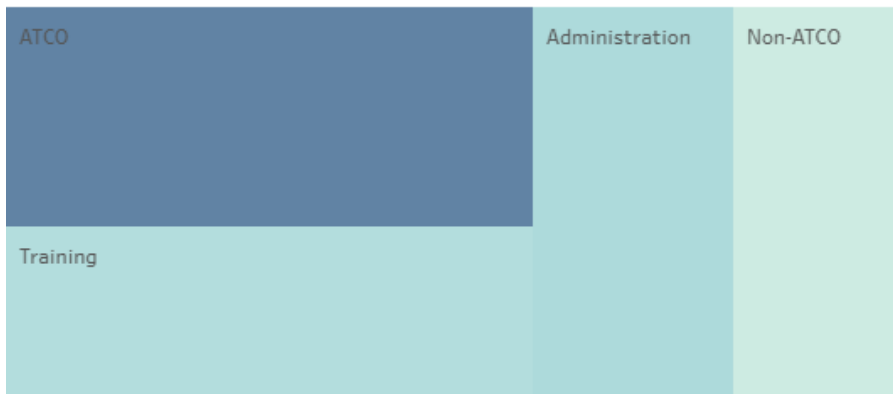
When a drop in engagement was identified, the Airways team responded with two forms of communications:

- ▶ Direct reminder emails to each participant
- ▶ Communications with organisational representatives to drive engagement internally.

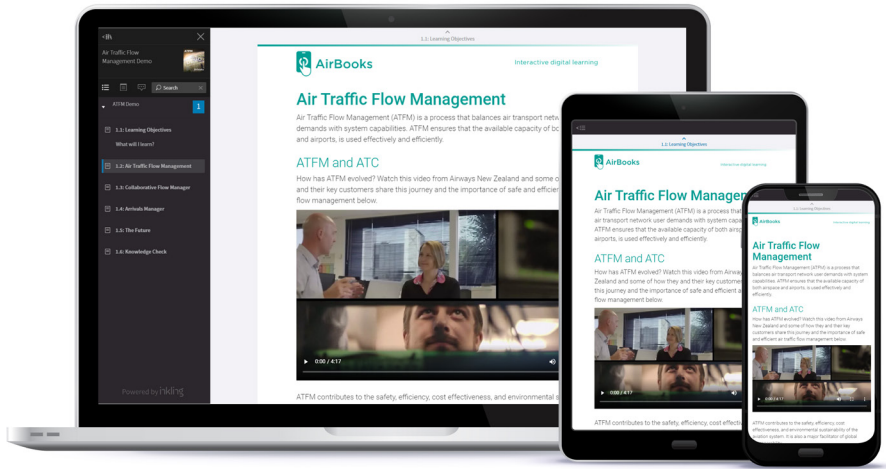
The data shows that the communications provided resulted in an uptake of engagement on a number of occasions. This is useful data, in that it shows the effectiveness of simple reminders.

Average usage by department

We gathered information about each candidate’s current job title and placed them into a generic department type so we could see the level at which each type of user was types of content.



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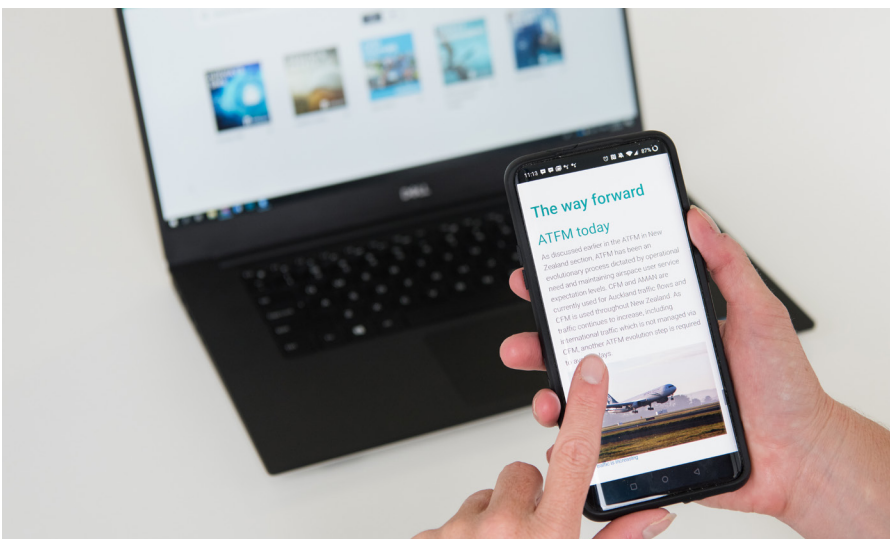


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Key themes that we found were:

- ▶ ATCOs had a much higher average usage than the other departments, with an average of 56 minutes per person. This was not surprising, as the PBN 101 AirBook was most popular with this department and is of a longer duration than the other AirBooks.
- ▶ The ATC 101 AirBook was most popular with both Training (50 minutes) and ATCOs (49 minutes) equally. This is expected from the training department, as the content in ATC 101 is suitable for their group. However, this was unexpected from ATCO as this is all familiar content for them. It could be speculated that it was used as a refresher and they were interested in how that information is conveyed to students in training.

SMS 101 was most popular among non ATCOs (46 minutes) – this was expected, as this is an area of information that would be most specialised for them.



Correlation between duration and assessment score

Analytics and data can also give us insights into the content we are delivering and the way in which our staff are engaging with it.

Some risk factors of delivering self-directed learning remotely are:

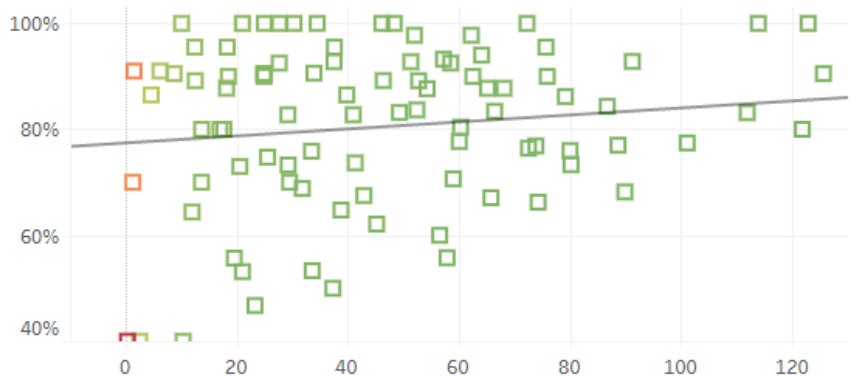
- ▶ The content alone is not at the quality required to deliver on the learning outcomes
- ▶ Users are not engaging with the material in the way it was intended.

By comparing each users' learning duration with their final assessment score, we can gain a better understanding of how our staff engage with the content and the impact it has on their performance. It also helps us identify outliers. For example, a user with a high score and low duration may need to be looked at more closely to determine if they have engaged in the training the way it was designed.

By comparing these metrics, we learned:

- ▶ There was overall a positive correlation between reading duration and final assessment score
- ▶ This was most prominent in ATC 101 and PBN 101
- ▶ Users who spent longer than the prescribed 30 minutes of learning time in SMS 101 performed more poorly in the final assessment. This is an interesting piece of information that could be investigated more closely. It may suggest a misalignment of the learning outcomes of other factors specific to the individual learners.

Assessment Scores by Duration



Organisation specific dashboarding

Each participating organisation was also provided with access to organisation specific data. This allowed them to track the progress of specific users, providing reporting metrics such as pages completed, completion percentage, sessions per person, duration per person, course completion status and assessment results.

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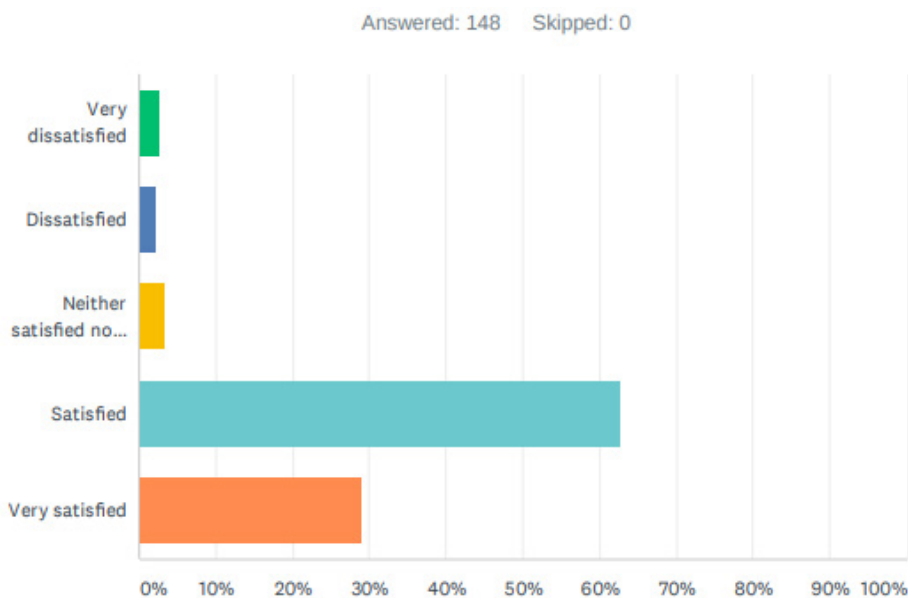
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Organisational post-survey

At the closure of the project, separate surveys were distributed to the participants and organisational representatives. The aim of these was to gather feedback on the users' experience with AirBooks as a digital learning tool, and to validate its potential to alleviate the pain points outlined earlier in this paper and learn how it could be improved.

Survey 1 - Participant feedback

Of the 220 users that participated by completed an AirBook, we received 148 survey responses. This is an exceptional response rate and reflective of a great level of commitment to the project across the CANSO group.



Overall experience

As a group 91.9% of participants were satisfied or very satisfied with their experience using AirBooks.

This is encouraging and provides some assurance around the attitudes of industry staff members in adopting new technologies for the purposes of training.

A number of questions were presented in the survey using the Likert Scale that covered the participating groups opinion on the platform, content and their desire to use the tool again. Each question received a weighted score between 4 and 5 meaning between satisfied and very satisfied.

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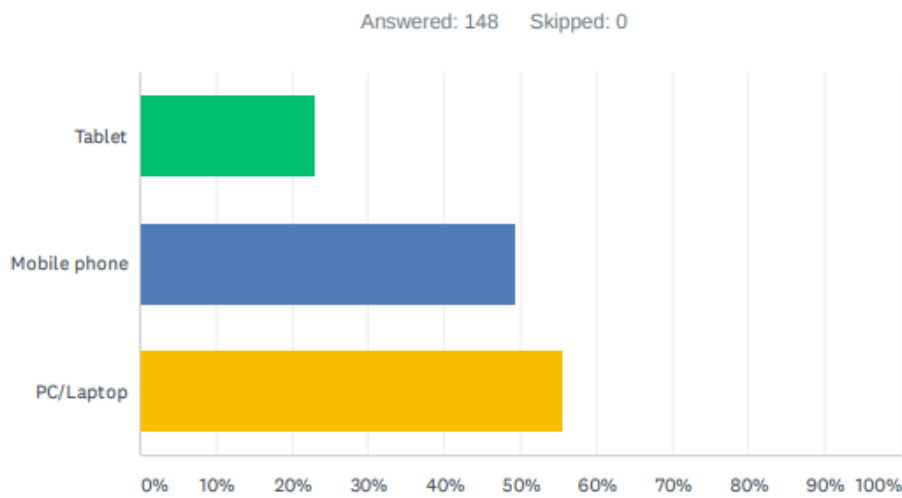
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Accessibility

As identified earlier in this paper, the accessibility of training materials on multiple devices is an expectation of the new generation of learners. What we did not know at this stage was how likely our cohort of CANSO participants (who span a number of generations) were to utilise mobile technologies in assessing the training content made available.



	STRONGLY DISAGREE	SOMEWHAT DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE	TOTAL	WEIGHTED AVERAGE
The interactive format of AirBooks helped me to understand the content.	2.03% 3	1.35% 2	1.35% 2	64.86% 96	30.41% 45	148	4.20
The content of the AirBooks was accurate and up to date.	3.38% 5	2.03% 3	6.08% 9	57.43% 85	31.08% 46	148	4.11
I believe AirBooks would be a good supplementary tool to traditional classroom training.	0.68% 1	2.70% 4	4.73% 7	50.68% 75	41.22% 61	148	4.29
I would use AirBooks again.	0.68% 1	4.05% 6	8.11% 12	45.27% 67	41.89% 62	148	4.24

The survey results showed that while the PC or laptop was the preferred device, there is a large percentage of people that also engaged in learning on a mobile device. This is an encouraging statistic that suggests that all people are becoming more and more comfortable with different forms of training delivery.

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Positive feedback and comments

We received a large amount of positive feedback about the use of AirBooks and its benefits to readers. Common feedback is outlined here:

- ▶ The ability to access the AirBooks anywhere and anytime. Being able to study at their own pace was also commonly noted.
- ▶ The e-learning platform made it much easier to intuitively progress through the AirBook using the tools provided. The use of the highlighter and search functionalities were mentioned in many responses.
- ▶ Great use of multimedia such as quizzes, games, videos, flashcards and images.
- ▶ Many responses mentioned that the content was very engaging, professional and enjoyable to read and use.

Improvements and changes

In the organisational post-survey we also wanted to gather feedback for potential improvements of AirBooks.

The first theme of this feedback was the lack of a bookmark functionality. Many users were often reading through the AirBooks in multiple sessions – AirBooks currently return the reader back to the page they were on but not to the section they were last reading, which can be problematic when reading longer pages.

Providing more feedback and reasoning for answers in the quizzes was also a commonly suggested idea for improvement. An explanation of why the answer is correct would be beneficial to the participants' learning, and would allow them to further understand the questions asked.

All feedback provided has been taken into consideration and will be used to further improve AirBooks.

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In conclusion, our research has found that digital learning tools such as AirBooks have the capability to address the many pain points around training within the ATC industry - including disruptions to the roster and availability of training resources, and staff engagement levels.

This project and its findings are particularly timely, with current travel restrictions and border closures severely impacting the ability of training providers to deliver traditional face-to-face training in the classroom.



At Airways we're well placed to transition from classroom-based training to an instructor-led virtual learning environment, where training courses will be delivered remotely during this period of the COVID-19 pandemic, using virtual classrooms and our AirBooks digital learning resources.

We're working hard to fully utilise these types of digital services to support customers as we all focus on business and operational continuity.

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