

The impact of storytelling in e-learning modules on participants' retention of information

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Learner retention and comprehension while taking an e-learning module can be achieved in many ways, for example via storytelling. Previous studies show that among the e-learning elements, including gamification and instructor-led sessions, narrative elements have been proven to positively impact how much learners enjoy, understand and remember e-learning modules. These studies have been based primarily on students within an educational setting, however, little research has been done in the past few years about storytelling elements in e-learning courses for adults in a corporate environment. We used data from a survey disseminated to working professionals in technical writing and two e-learning modules, one with and one without storytelling elements, to test this hypothesis of a possible positive relationship between the inclusion of storytelling and learner comprehension and retention. Our findings indicate that narrative elements are useful in increasing learner retention and comprehension.

Keywords: e-learning, storytelling, narrative elements, learners, retention, comprehension

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Introduction

E-learning modules are comprehensive digital learning tools designed to provide an engaging and effective educational experience. They integrate various elements such as text, multimedia (videos, audio clips, images), and interactive activities (quizzes, simulations, and drag-and-drop tasks) to cater to different learning styles. The structure typically includes modules and lessons, which help organize the content and facilitate easy navigation. Additionally, features like progress tracking, clickable elements, and gamified components (points, badges, leaderboards) enhance motivation and engagement.

These modules are often integrated with Learning Management Systems (LMS) to provide tracking, reporting, and user management capabilities. Accessibility is a key consideration, with responsive designs ensuring compatibility across devices and accessibility features like text-to-speech and captioned videos supporting diverse learners. By combining clear, concise content with interactive and multimedia elements, e-learning modules create a dynamic learning environment that enhances understanding, retention, and practical application of knowledge.

Technical writing is a form of communication that provides detailed information on complex topics in a clear, concise, and structured manner. It is primarily focused on conveying technical or specialized information. E-learning modules are intrinsically linked to technical writing. They not only convey complex information efficiently but also ensure that learners remain motivated and retain the information long-term.

Numerous studies show that among the e-learning modules' elements, storytelling has been proven to have a positive impact on how much learners enjoy, understand and remember.

Zambito (2008) discussed the effectiveness of narrative elements in e-learning modules and outlined several reasons why they work so well. According to her research, storytelling aligns with how the human brain processes information, making it easier to remember and interact with compared to traditional learning methods like presentations with bullet points. It creates a more immersive experience, motivates learners, and fosters an emotional connection to the subject matter. By presenting concepts within the context of a story, learners can better understand and remember complex information.

The Art of Storytelling in eLearning: Engaging Learners Through Narrative (2023) provides grounds to support this belief. Indeed, it delves into the transformative impact of storytelling in e-learning by highlighting its capacity to engage learners and deepen their comprehension. It discusses how storytelling goes beyond traditional teaching methods by involving both cognitive and emotional aspects of learning. By triggering neurological responses and fostering emotional connections, storytelling aids in remembering key information and enhances understanding.

However, these studies have been based primarily on students within an educational setting, but little research has been done in the past few years about incorporating narrative elements in e-learning modules for adults in a corporate environment. Consequently, this research paper explores the impact of storytelling within e-learning modules, examining how narrative elements can improve their retention of technical information.

This research is based on an analysis of the responses to our survey from 36 people in work and the progress made over two weeks by the 8 people who tested the modules with and without storytelling.

Methods

The objective of this study was to establish a connection between storytelling elements in e-learning courses and participants' retention and comprehension. To this end, we employed 2 research methods. For maximum efficiency, we decided on one quantitative and one qualitative method. The first was a survey and the second was two e-learning modules with and without storytelling elements. Our quantitative method, the survey, was chosen for its ability to provide statistics that could be used as a juxtaposition to the claims made in the literature available on this topic. The qualitative method, the e-learning courses, was used for participant observation to facilitate studying the participants and their behaviour while they took the course.

The survey

The survey was diffused to thirty-six participants belonging to 3 technical writing companies of varying sizes: one small, one medium-sized and one large in industries ranging from energy, transport visibility and information software. This survey had 9 questions and was intended to get a general idea of the experience of technical writing professionals with e-learning courses, parse if they had experience with modules that included storytelling and get an idea of their satisfaction with the different elements of these modules.

The e-learning modules

Additionally, we designed two (2) e-learning modules which were completed by a sample group of eight (8) participants. Both modules focused on the Solar System, however, one contained narrative elements, and one did not. They were split into two groups, a control group of four (4) persons who completed the e-learning module without narrative elements and an experimental group composed of participants who completed the model with storytelling. Both groups completed the same quiz twice. The quiz was first administered directly after the participants completed the course, and again two weeks after having done the course. For the second quiz, participants did not have access to the course materials and were meant to answer the questions using what they had remembered from two weeks prior.

We chose this scientific method for its obvious comparative benefit and its ability to prove that retention was notably higher among participants in the experimental group. Specifically, we aimed to establish causation between narrative elements and retention.

All participants were accompanied by a member of the research group while completing the course and the second attempt of the quiz. The research group was largely non-participatory and non-obtrusive throughout this process and this choice was made as we were observing behavioural patterns that were sometimes difficult to self-report. It was observed that a few of the responses from the survey were vague and these responses hinted that the participants might not have paid much attention to their responses and behaviour while completing courses in the past. A slight overcorrection with our second research method was therefore implemented as a solution.

A longitudinal research time horizon approach was employed for collecting data for the e-learning modules, while a cross-sectional approach was taken for the survey.

The limitations

Creating the e-learning course for this research required access to a tool that would allow participants to have access from their personal or work computers. This limited the sample to persons with access to a computer and internet connection. Articulate Rise was used to create the e-learning courses, however, hosting these courses online, as opposed to via downloadable HTML files, required a license which was not covered by the budget allocated to this research. Consequently, the course files had to be shared with the participants and unfortunately could not be accessed via mobile.

These conditions required non-probability, ease of access or convenience sampling. The careful selection of participants was based on internet access, access to a computer and a basic understanding of HTML files. This selection bias, coupled with a particularly small group, threatened to affect the representativeness and accuracy of our research. However, it was decided that a sample size for the e-learning courses that was no less than 20% of the number of participants who completed the survey would be sufficiently accurate for this study. We therefore capped the survey at 36 participants, and 8 participants (20%) for the course.

Discussing the results

We expect that the e-learning module containing narrative elements will have higher quiz scores on the second attempt than the module without narrative elements. We also anticipate that most participants might not have ever considered that the elements used in the modules were narrative elements. Similarly, we anticipate that the survey participants might not have paid much attention to the compilation or conception of the e-learning modules they have taken in the past and might find it difficult to respond to the questions that we asked them about specific narrative elements.

The survey

E-learning modules are mostly known for their flexibility (self-paced study) and interactive elements (quizzes, simulations, drag-and-drop tasks, etc.). However, when asked what they remember the most after completing an e-learning modules, our respondent mostly picked practice.

After having completed an e-learning module, what do you remember the most?

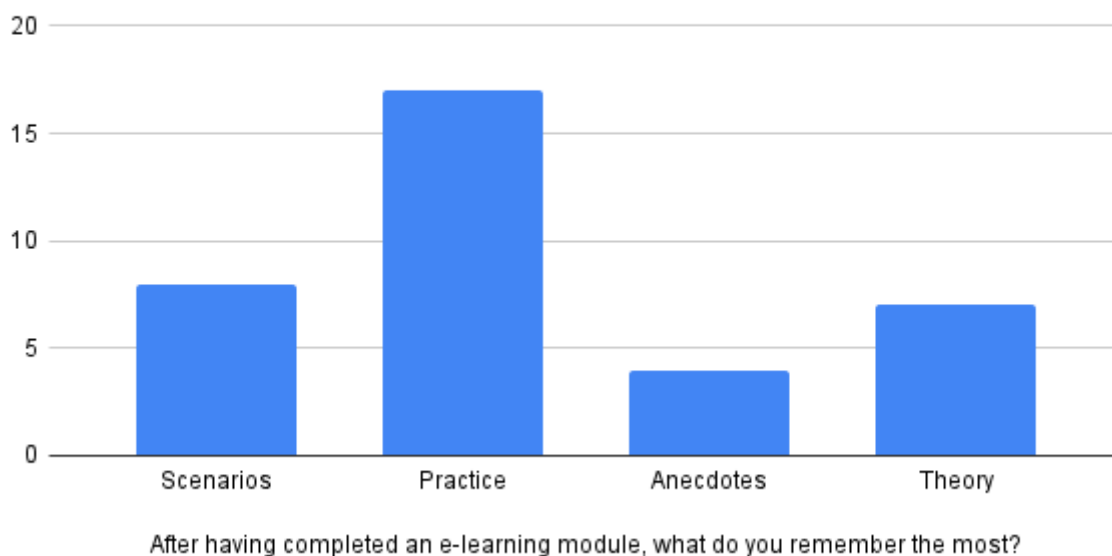


Figure 1: Results to the question “After having completed an e-learning module, what do you remember the most?”

However, it's interesting to note that scenarios came second. While our respondents did not necessarily use the keywords "storytelling" or "narrative elements" in their short responses to the question "What affects your motivation?", there were 5 mentions of "scenarios" or "use cases." Moreover, among the 36 respondents, 6 of them find stories very much effective in helping them remember information and 14 of them find them effective.

To what extent do you find these elements of e-learning modules effective? [Stories]

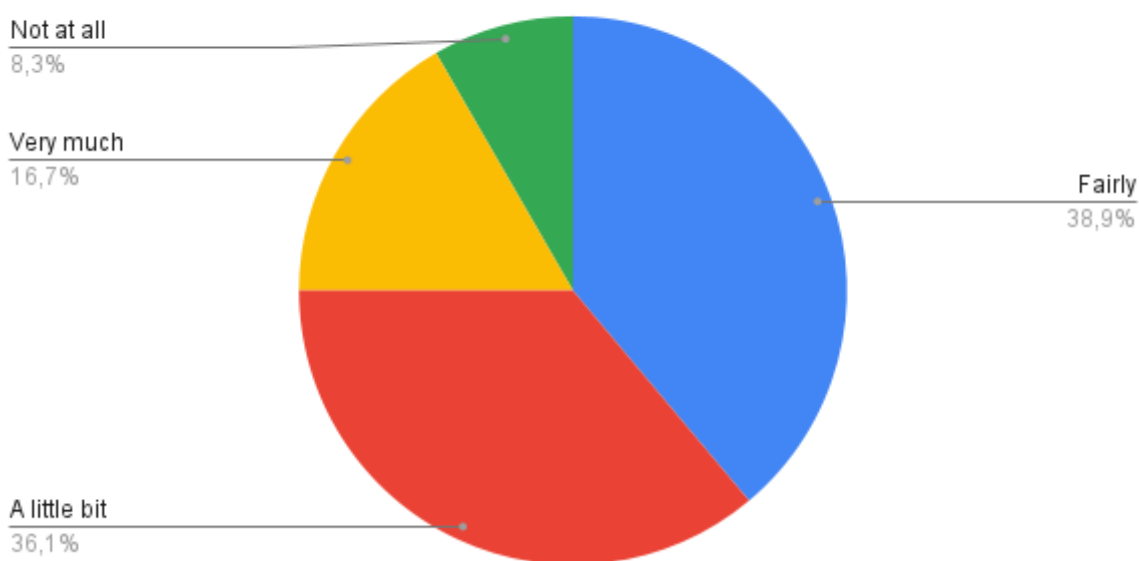


Figure 2: Results to the question "To what extent do you find these elements of e-learning modules effective? [Stories]"

In analysing the short responses, we can also highlight that Veletsiano and Houlden (2019) underlined the need for instructors to be skilled in creating content intended for flexible learning and how the lack of this skill impacts learners' enjoyment of e-learning courses. Several participants outlined the lack of interactivity and the lack of feedback as seen from the response below:

"I think what often stands out in e-learning modules is theory plays a big part in the general course. Although I love theoretical knowledge, it is the application that will mostly be of use in my everyday professional life. I would maybe like more tangible examples or use cases with feedback and personalisation of elearning modules."

Some participants also mention the fact that they would like e-learning to be more recurrent in their work *"We need regular updates of the modules, and more quizzes."*, *"More practice sessions."*

While the participants did not necessarily use the keywords “storytelling” or “narrative elements” in their short responses, the responses featured five (5) mentions of “scenarios” or “use cases.” They generally opined that the addition of these would create more effective e-learning courses. The decision to omit the keywords from our survey was made from a belief that “narrative elements” might be too vague or abstract a term to those unfamiliar with e-learning. According to Rajputh and Rajabalee (2019), “an engaging story is an essential element in scenario-based eLearning.” They later posit that scenarios and storytelling are important in problem-solving and helping learners to reframe theoretical knowledge and apply it to a real-life context. In the responses that did not reference scenarios and stories, respondents cited a need for “more focus on practice than theory” and a need for e-learning courses to be “closer and more aligned with our activities” and “concrete and applicable examples”

The e-learning modules

Two e-learning modules were designed for this study. Both courses focus on the solar system, and particularly the telluric planets (excluding Earth), namely: Mercury, Venus and Mars. The objective of both courses was to introduce learners to “fun facts” about each planet and provide them with information about the individual and distinctive features of each planet to help differentiate them from each other, compare them to the sun and envision them relative to concepts with which they might be more familiar. We approached content creation from the perspective that out of space was foreign to our participants and that they would have difficulty grasping the sheer magnitude of the planets.

The module without e-learning adopted a tone and style like the one found in a textbook targeted at non-experts. The text was structured into short paragraphs with language that, while still specialized, was familiar enough to be understood by the public and our audience, persons vaguely familiar with the solar system or who had at least been introduced to it during primary to secondary level education.

The e-learning module with storytelling included the same information as that found in the other module, however, this information was relayed to the participants via the life of a fictional character, Céline. This character and her misadventures, as well as her objective, were introduced early in the module to appeal to the ethos of the participants to not only engage them in the facts but to get them implicated in Céline’s mission and to root for her. Bruner (2002) suggests that we are over 20 times more likely to remember a fact when it is told via a story.

Lesson 1 of 6

The beginning of a grand journey

LG Léa Guiouillier

Céline's cryonics procedure went all wrong. Upon waking up, she first thought that the gray orb spottable through the big window at the front of her spaceship was the Moon. However, because of the sheer size of the Sun and its blinding light, she quickly realized that something went awry. Indeed, it was not the Moon Céline was looking at, but Mercury! She was millions of kilometers away from Earth, her initial destination.

Céline, thinking she would never be able to go home again, started to panic but tried her hardest not to in order to brainstorm a solution to her predicament. She was experiencing a setback during her return to Earth, and her team, who stayed on their home planet, would certainly think something terrible happened to her. Moreover, her spaceship did not have enough energy to make the journey back in one go.

However, Céline quickly realized that this was an amazing opportunity to learn more about Mercury so she came up with a plan.

Figure 3: The introduction of the e-learning module with storytelling.

The idea was to link every tidbit of information about the individual and distinctive features of each planet with a narrative element to increase the participants' chances to remember them a week later. For example, concerning Mars' thin atmosphere not being able to retain heat and its low pressure, the information was presented as below.

Temperatures

The temperature can rise to 20°C, but can fall as low as -153°C. It was hard for Céline to know what to wear on Mars, because **its thin atmosphere doesn't retain heat**. When she was standing at the equator at midday, her body was feeling a temperature difference of more or less 20 degrees between her head and her feet. Moreover, the pressure is so low on Mars that, if she were to not wear a suit, she would die immediately, her blood literally turning to bubbles!

Figure 4: Content about Mars from the module with storytelling.

Similarly, Venus' thick and toxic atmosphere is a core feature that participants needed to remember so narrative elements were carefully incorporated.

Céline had to be very careful while putting on her suit, triple checking the state of everything. She absolutely could not see the surface of the planet from her spaceship because of **Venus' thick and toxic atmosphere**. Céline realized after a few calculations that it traps the heat, a bit like a **greenhouse effect**, making Venus **the hottest planet in the solar system**. Its surface is 475°C, hot enough to melt lead! However, Céline estimates that the greenhouse effect makes the planet about 390°C hotter than it should be.

Figure 5: Content about Venus from the module with storytelling.

To determine if narrative elements have a positive impact on participants' retention of information, the information about the individual and distinctive features of each planet were presented as they were, and the bold elements were kept.

Temperatures

The temperature can rise to 20°C, but can fall as low as -153°C. **Its thin atmosphere doesn't retain heat**. If you were to stand at the equator at midday, your body would feel a temperature difference of more or less 20 degrees between your head and your feet. Moreover, the pressure is so low on Mars that, if you were to not wear a suit, you would die immediately, your blood literally turning to bubbles!

Figure 6: Content about Mars from the module without storytelling.

the stars or the Sun. This is due to **its thick and toxic atmosphere**, which reflects 80% of the light from the Sun, 108,000,000 kilometers away.

Venus' atmosphere also makes it impossible to see the surface of the planet from space. It traps the heat, a bit **like a greenhouse effect**, making Venus **the hottest planet in the solar system**. Its surface is 475°C, hot enough to melt lead! However, it is estimated that the greenhouse effect makes the planet about 390°C hotter than it should be.

Figure 7: Content about Venus from the module without storytelling.

Other than the added narrative elements, since we needed to measure the impact of storytelling on participants' retention of information, which is one factor, the content of both modules is the same (fun facts included, as seen above)

Concerning the five questions specifically designed to measure the participants' retention of information when narrative elements are incorporated, the results indicate a positive impact. Question 1, 2 and 5, respectively "Which is the hottest planet in our solar system?", "Which planet's atmosphere does not retain the heat from the Sun? (multiple answer)" and "A __ is responsible for Venus' thick and toxic atmosphere." are linked to narrative

elements and participants who completed the e-learning module with storytelling did notably better than the participants who completed the e-learning module without storytelling.

Number of participant who got the right answer (without storytelling)

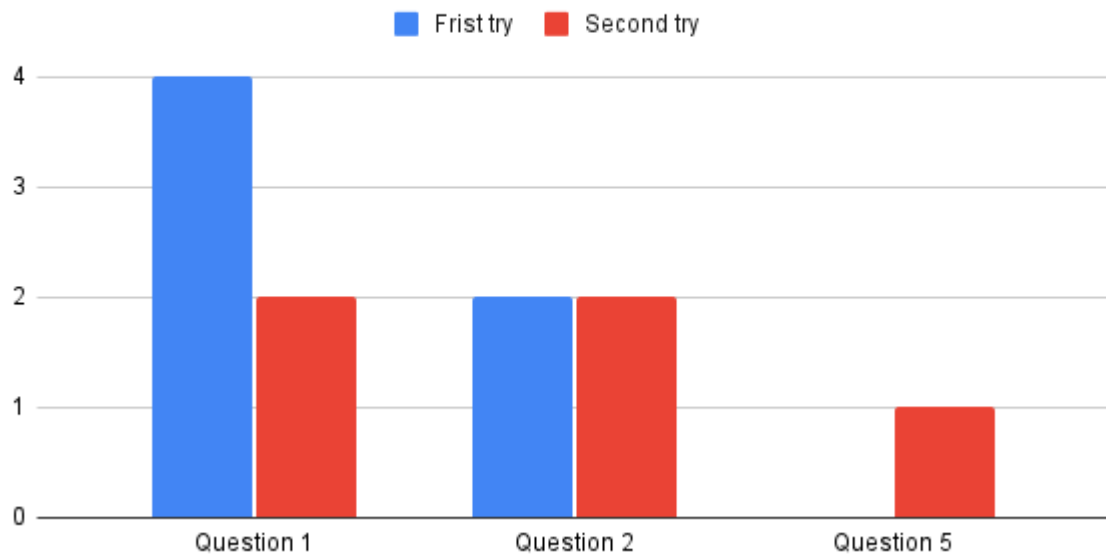


Figure 8: Number of participants who got the right answer (without storytelling)

Number of participant who got the right answer (with storytelling)

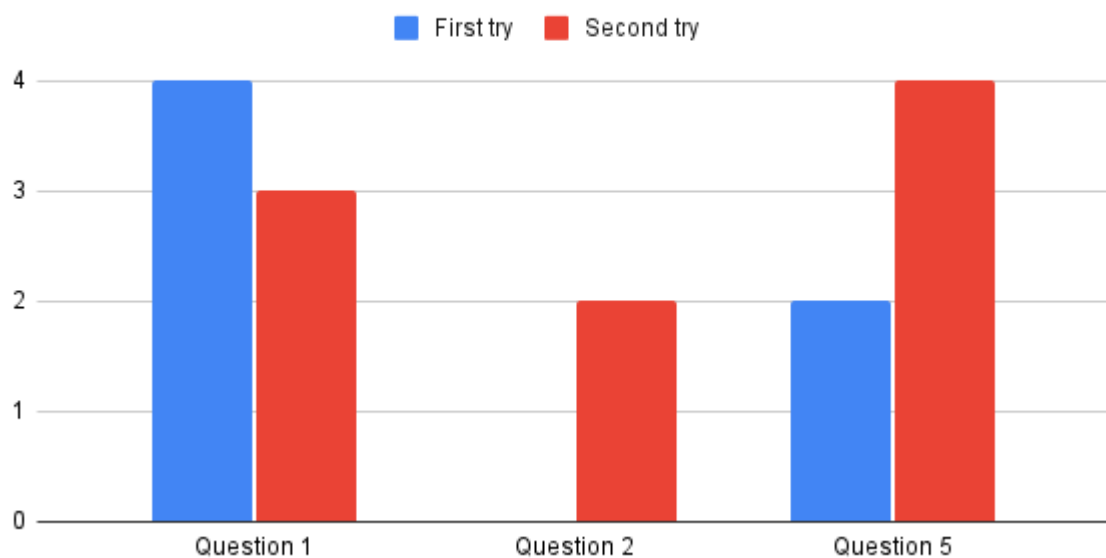


Figure 9: Number of participants who got the right answer (with storytelling)

Question 3 and 6, respectively “Mercury's biggest crater, Caloris, is 1,500 kilometres wide, twice the distance between __ and __. (Rewrite "and" between your two answers.)” and “If the Earth were the size of a 5-cent coin, Mars would be the size of __.” are centred around fun facts. The idea was to gauge if the information is easier to digest when presented with surprising, funny explanation or clarification. Mars is smaller than the Earth, and if the Earth were the size of a 5-cent coin, “Mars would be the size of a grain of rice” is easier to remember than 4-digit numbers.

Discussion

Even though fun facts are not necessarily narrative elements, it is interesting to note that the four participants who completed the e-learning module with storytelling did way better than the 4 participants who completed the e-learning module without storytelling. The number of participants who had storytelling in their module and got the right answer to question 3 and question 6 increased on the second try. However, the number of participants who had no storytelling in their module and got the right answer to question 3 went from 1 to 4 and the number of them who got the right answer to question 6 went from 4 to 1. This could mean that storytelling increases participants’ retention of information, not solely for the information directly linked to narrative elements. It seems to be an efficient approach, especially because the participants who completed the e-learning module without storytelling did not improve but did worse than they did the first time they answered the questions.

The participants who did the e-Learning module with storytelling obtained the best results for the second attempt. One participant succeeded with all the good answers, two succeeded with only one wrong answer. But we can denote that one participant was not helped by the storytelling and failed in the second test, out of nine questions, they obtained only three good answers. In general, the participants who did the e-Learning module with storytelling had good retention of information.

The participants who did the e-Learning module without storytelling obtained the worst results for their second attempt. They obtained three, five, six, and two wrong answers out of nine questions. They globally had a rate of success inferior to the participants who did the e-learning module with storytelling. The participants of the e-learning with storytelling succeeded at 77,8% on their second try, one week after the first try. The participants of the e-learning with storytelling succeeded at 55,5% on their second try, one week after the first try.

Our study meets the reflection of Eoin O'Neill (Storytelling in eLearning and How to Use it Effectively in Scenario-Based Learning, June 8, 2023) “Through narratives, eLearning content becomes more relatable and engaging, enabling learners to connect emotionally with the material”. Here by using the character

of Celine, a lost astronaut who discovers the telluric planets, we engage the learner into remembering the information, because it is not given by an impersonal instructor, but by the protagonist of the story.

Conclusion

This study aimed to measure the positive impact of narrative elements in e-learning modules on participants' retention of information. E-learning modules are mostly known for their flexibility (self-paced study) and interactive elements (quizzes, simulations, drag-and-drop tasks, etc.). While our respondents did not necessarily use the keywords "storytelling" or "narrative elements" in their short responses to the question "What affects your motivation?", there were 5 mentions of "scenarios" or "use cases." Among the 36 respondents to our survey, only 6 of them find stories very effective in helping them remember information and 14 of them find them effective.

The answers to our survey and the progress made by the participants who completed the e-learning module with storytelling compared to the progress made by the participants who completed the e-learning module without storytelling indicate that incorporating narrative elements in e-learning modules indeed helps participants to better remember information. The 4 participants who completed the e-learning module with storytelling did notably better on the second try than the 4 participants who completed the e-learning module without it.

However, it is interesting to note that 1 participant who completed the e-learning module with storytelling did quite poorly. They got 3 right answers in the first try and 3 right answers in the second try. They explained after completing the module for the first time that the amount of information was overwhelming and the added narrative elements only made the content lengthier and more confusing. Moreover, several respondents mentioned in their short responses that they enjoy "straight to the point content" that focuses exactly on what they are looking for. It is entirely possible that incorporating narrative elements in e-learning modules might not be an effective approach for everyone. E-learning modules with straight-to-the-point content could be an interesting topic for future study.

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About the authors

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