Linking Innovation and eLearning – The Case for an Embedded Design

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Abstract. The need to link eLearning and innovation has been discussed in depth in education and entrepreneurship since its inception 30 years ago. In times of subscriptions and anonymous selling via the internet organisations have one need prior to adopting a product: they need to acquire the right skills to accept the innovation a new product brings them.

There is significant research outlining how eLearning supports the increase of knowledge in general and especially in organisational product adoption which details both the positive and negative impacts and practicalities of eLearning and its use. This cross-industry multi-case approach in automotive, healthcare and other sectors investigates the status and the potential of eLearning in Big Tech.

We present findings that suggest embedding all needed eLearning directly into products before or during product introduction. Short and immediate eLearning and usage of simulations to uniform processes is the solution to increase product adoption. This suggestion is not only changing the well-known product lifecycle model by integration eLearning into the product, as AI will be able to analyse the eLearning data and give valuable feedback for the future product and process improvements.

Keywords: eLearning · Innovation · Cross-sector · Multi-case approach · Automotive · Embedding design

1 Introduction

1.1 Overview

The largest subscription deal without the client adopting the product and expanding its usage is not worth anything. The survival of most companies no longer depends on the sales rep with the largest deal – but on the best strategy to drive product adoption in a global economy.

Worldwide sales do not allow local resources managing a relationship, not even speaking about consultants that can help with problems, as recommended in the past by

academics and practitioners. The often-discussed skill gap in all industries is adding to this challenge, as missing skills increase the challenge of people not using a product. This brings up the question around the role of eLearning. During the last 30 years eLearning has evolved greatly based on the major technology trends. Today, most companies use eLearning. But most product manufacturers do not yet have a conceptualised way in supporting their clients with the right eLearning to support organisations to adopt new products.

This means this research has two objectives to contribute to practice and academic knowledge, as outlined in Table 1.

Table 1. Overview objectives

AIM	
Explore how synchronising eLearning and product/process innovation significantly enhances organisational acceptance and product adoption	
Objective 1	*Objective 2*
Construct a mobility industry cross-case approach proposing that a conceptualised eLearning improves organisational acceptance significantly	Develop recommendations for the future use of an embedded eLearning acceptance, especially for the newly defined mobility sector

The structure of the paper is as follows: after this introduction, a literature review gives an overview of the current research and concludes with the research questions. In the following section, the methods and data collection are described. The next section describes the detailed case approach, and the analysis and findings are summarised in the last section of this paper.

2 Literature Review

This section outlines the existing literature around eLearning and its effectiveness, product adoption and AI, which also generates our research questions. This research builds on the SPI Manifesto, in particular the section on the learning organisation as well as the use of dynamic an adaptable models as needed [1].

2.1 eLearning

Definition. There are many definitions around eLearning that are used by researchers, and there are recent approaches of coming to a common understanding [2] or even trying to simply find agreement of a suggestion for a common definition. The research process of agreeing to a final definition has not been without the critical thoughts of experts for the final version [3]. Nonethel, Sangrà, Vlachopoulos and Cabrera [3] came up with a categorisation of eLearning and identified four categories: technology-driven, delivery-system-oriented, communication-oriented, and educational-paradigm-oriented

definitions. Of those four categories, the category of 'delivery-system-oriented' has been chosen for the current research. It is characterised as "[] e-learning as a means of accessing knowledge (through learning, teaching, or training)" [3] and, thus, the best fit for the purpose of this research which deals with the transfer of knowledge. Within this category there are multiple definition suggestions summarised in the category [4–7]. We have chosen the most flexible [7]: "E-learning is the delivery of education (all activities relevant to instructing, teaching, and learning) through various electronic media."

Effectiveness of eLearning. The research of Derouin, Fritzsche and Salas [8] affords a good overview of existing research around the effectiveness of eLearning. Now being 15 years old, it indicates that eLearning can be effective, but it depends on "how it is designed, delivered, and evaluated" [8]. In recent years many other studies have also suggested the organisational needs and effectiveness of learning in general [1] and eLearning [9–11]. There is even research indicating that there are no differences in generations [12]. On the other hand, there is critical research stating that eLearning cannot be taken in general as effective [13] and that effectiveness is dependent on the usefulness and ease of use of the eLearning or is dependent on factors like 'learner control' [14] and others.

The summary for the current research is that there is significant research that indicates that eLearning is effective under certain circumstances and for certain groups if not even a full replacement for any other delivery method [8, 10].

2.2 Organisational Product Adoption

Product adoption in the context of this paper is defined as "all activities involved in making sure the customer is successfully adopting and expanding their use of the solution" [15]. Considering the meaning of knowledge in organisational product adoption there is significant general research dealing with knowledge and learning in organisations [1, 16–18]. The current work is not looking into individual product adoption but focuses on organisations. And even with being triggered by the availability of subscriptions, it is not investigating whether there is a different way adoption works based on subscription business models [19]. The work of Ettlie [17] introduced valuable results for the current research. His research built on Rogers [20] five-stage model and concluded with a sixth stage reflecting the organisational influence in adoption. From an organisational point of view, a quote from Frambach and Schillewaert [21] offers additional insights around organisations. They state that more research needs to be done around "The factors influencing different pre-adoption stages within the adoption process, rather than the adoption or non-adoption decision itself." Looking into innovation in organisational product adoption, there is research stating that "the direct influence of innovation development activities and processes on adoption remains under-researched" [22]. Hsu and Lin [23] offered further guidance when speaking about future research with their statement that research is needed around services components, as those are influencing adoption. Other scholars [24] investigated SME (small and medium-sized enterprises) providers' influence around knowledge and came to the same positive results as [25, 26], advising that their work around SME now suggests an "opportunity to develop a new model that can target other players" [24].

2.3   Innovation

Overview. Every innovation needs a trigger. "Certainly, technological innovation is a huge creator of economic value and a driver of competitive advantage" [27]. In this paper the focus is around AI, as usage data from eLearning can easily be analysed using AI.

AI. Academic research around Artificial Intelligence (AI) [28–32] can be structured into 'weak' and 'strong' AI, and a variety of research fields beneath. Weak AI is describing research assuming that AI can take over any important task that a human can execute. On the other hand, strong AI is dealing with the assumption that AI can be superior to the results human can produce. Strong AI is not only causing lots of discussions if it really can exist, consequences of its existence and subsequently lots of ethical questions.

2.4   Research Questions

The above can be summarised into two research questions. The first is directly derived from the general research gaps mentioned around eLearning and organisational product adoption in the technology sectors [10, 14, 33, 34]. The second one is looking into the findings, especially for the automotive sector. Based on the need for standardised processes and security, the automotive industry should be treated as a special case. This is also supported by the SPI Manifesto [1], leading us to the following questions.

1. What are the characteristics for eLearning to be embedded in the innovation process?
2. What is the experience from the automotive industry beyond the general findings across the sector?

3   Research Strategy

Multi-case Approach. This research follows the multi-case approach which borrows extensively from Eisenhardt [35], followed by Yin [36]. From the conceptual approach, this research uses a multi-case approach, following the categorisation by Yin [36] on how case studies can be structured.

Network Sampling. The cases in Table 2 were selected with a network sampling method [37–39] with all cases in Europe and the US. The Asian region was excluded as existing organisational research suggests that product adoption decisions are made differently in the Asian region [40, 41] than in the rest of the world. The drawback of this sampling approach is the risk of bias introduced by the starting points that the researcher chooses [38]. The current research mitigates the risk by using three different groups of people to start the network sampling. This assures minimum bias from the author in choosing the cases. To further reduce the bias, the criterion was put in place that none of the interview partners was part of the researchers' networks prior to the interviews.

Three Starting Points for the Network Sampling. As mentioned in this research, the selection uses the network sampling in the following way. The authors use three networks as starting points for the sampling. First, their network to the top training companies

[42] to ask them for their interesting clients and links to HR leaders responsible for the training strategy. Second, their network inside IBM. The approach is again the same as with the training partners, which means asking colleagues for clients they are working with and contacts into HR, and thirdly LinkedIn. The limitation set by the authors was either to be Fortune 500 companies or at least large companies, where large was defined as more than 20,000 employees. The authors did not interview anybody of their own existing network. Based on the LinkedIn information of all interviewees, none ever worked at IBM.

Maximum Variety. After starting to receive names to run interviews and build cases, we realised after the third interview that we had already covered three different industries. As the pilot study showed that finding interview partners is not easy and, based on the exploratory character of the research, there was no plan to select a specific industry and not to spread across industries. Especially as, in a multi-case approach, the replication is key and not the sampling [43]. However, as the first cases showed that we had access to multiple industries, we revisited the selection criteria. Patton [37] outlined a selection of 'maximum variety' to drive the data; therefore, we decided to add the criteria "each case must come from a different industry" as additional to the above-described network selection. Independent of the results, there will be additional research needed in each of the industries, but the maximum variety will again increase the value of the research as the results will "cut across cases and derive their significance from having emerged out of heterogeneity" [37]. The work around the first three cases was influenced as they were already from three different industries.

Table 2 gives an overview of the cases. Further details and career data around the interviewees can be found in Table 3 in the Appendix. The career data were extracted from LinkedIn and anonymised. The interviews are numbered in the sequence they were executed between January and October 2020.

Triangulation. Further to the described rigor to stay neutral from an author's point of view in selecting the cases, this research uses the concept of triangulation to increase the value of the findings [35, 43, 44]. The foundational work around triangulation from Patton and Denzin and Lincoln [45] describes four types of triangulation. For the current exploratory research, we decided to use expert interviews in the sense of data triangulation [46, 47] to increase validity. As outlined by the research, in using triangulation the purpose in data triangulation is not to verify the existing data [37, 45, 46], but to add a new perspective. In the current research, the additional data point is experts from the learning industry.

Table 2. Overview of cases

Case/Interview/Region	Sector/Size	Overview case
C1/I1 EMEA	Distribution Fortune 100	The company earns revenue out of distribution of hardware and software. With this mix, the company is an interesting example with a history of more than 50 years and business covering a more heritage area as well as modern software up to cloud solutions. The interview partner was the director, responsible for the HR graduate programme on the software side of the company, who also has extensive experience in various roles inside the company. **The expectation** is to get insights into a company with both an old heritage business (>70 years) and new modern units. There is deep experience in the company around learning. How is the experience internally? Insights should be of interest for all Fortune 100 companies
C2/I2 EMEA	Professional services > $7B	They work together with one of the Fortune 100 companies when their clients need consulting. With this, Case 2 adds the services sector to the chosen cases. The interviewee I2 has a deep background in learning and did considerable eLearning development in former roles. The expectation to this case was, on the one hand, to add a view from the professional services industry in general, but also to understand what this industry is suggesting to their clients. **The expectation** is to see what consulting companies are recommending their clients and what they do internally
C3/I3 EMEA	Medical care Fortune 500	The interviewee I2 was one of the youngest leaders in the cases, but obviously had the trust of the company to lead their learning. This makes sense as he had, in his relatively short career, ownership of his own company in the eLearning area as well as additional roles. Obviously, the company was interested to move their learning forward into the modern age. I2 mentioned that he was surprised how slow progress is happening in a large company. **The expectation** is to see if a sector dealing with extensive data security adds insights to the research

(*continued*)

Table 2. (*continued*)

Case/Interview/Region	Sector/Size	Overview case
C4/I4 US	Healthcare Fortune 500	As expected, data security and confidentiality are important in this sector. I4 stressed multiple times that his statements were his personal statements and not reflecting any official statement of his company, nor did he want to have his or his company name displayed. Compared to all other interviewees, I4 is not in a dedicated role taking care of learning. He is the VP HR, and learning is part of his role. There is no other HR role in the company taking care of learning in a more dedicated way. **The expectation** is how an industry using a great deal of modern technology treats eLearning
C5/I5 US	Hospitality Fortune 500	This is a case in an industry with many employees and many of them changing roles and locations. I5 has much experience from roles in learning in his early career and experience as VP and SVP in various companies in HR as well as in HR Learning and Development. The expectation of the case is the experience of large enablement reflected based on the employees' changing roles and locations. **The expectation** is to gain insights into an industry with many changes in employees and how they use eLearning to drive adoption
C6/I6 US	Online learning platform >$200M	The company is one of the pure eLearning platform companies and declares that they are one of the leading eLearning companies. I6 had already, prior to joining this company, 20 years of experience in the HR area with HR in general and training employees. It is, in general, interesting that a very modern eLearning and young company is recruiting for this position a senior manager with extensive existing training experience. **The expectation** is to see how an eLearning company uses eLearning differently than a Fortune 100
C7/I7 US	Automotive Fortune 500 (until some years ago)	C7 is expected to add value from another industry point of view. I7 is not a VP inside the HR team, but on a director level. However, his role is still responsible for the implementation of learning. He has a deep background in learning **The expectation** is to gain some additional insights into eLearning in automotive and to see if the cross-case findings of the other industries apply

Details of Cases

4   Use Case: eLearning Across Multiple Sectors

4.1   Analysis Regarding Research Question 1: What are the Characteristics for eLearning to be Embedded in the Innovation Process?

Overview. There are three surprising themes that did come up across all cases, which are the need for 'immediate' and 'short' eLearning as well as 'AI'. Besides these three topics, the analysis also highlighted two additional facts, a 'platform' containing all needed learning is considered as helpful, and companies also accept to use multiple platforms if this helps to get access to the right content. In this context, all interviewees used the word 'platform' as a synonym for a company providing a platform with 'Massive Open Online Courses' (MOOCs). The other fact is that so-called 'compliance training' is, in most companies, the first usage of eLearning and a typical starting point for rolling out eLearning in a company that did not yet use eLearning at all. The term 'compliance training' was used by the interviewees as a summary for any mandatory training that employees have to attend on a regular basis, for example 'export regulations', 'sexual harassment' or 'security at the workplace'.

Immediate eLearning. The topic of 'immediate' was usually the first big topic that came up in most interviews. Throughout each of the cases, it appears with different words, but it is visible in all cases. The first appearance is in the interviews 2 and 4 as the word 'ad-hoc' came up in both cases during the search for keywords. We were surprised around the words 'ad-hoc' and this caused the investigation as to if there was a further theme. Other cases use 'quick', 'right moment [...] in time', 'on demand', 'short term skill-building capability' and 'I need the solution now for my problem'. Case 5 is an interesting exception, missing any mentioning of 'immediate' usage. The statement from I5 with "My industry has not been great at using eLearning that much" explains that they just do not have enough experience. But the topic still came up somehow as I5 mentioned that she believes "most people have a smartphone these days [...] We need to do better as an industry of learning professions debunking that it's difficult to access eLearning because it's really not."

Short eLearning. The second theme that came up in six of the seven cases during the interview around the research question of existing well-working items is the theme that we summarised as the need for 'short eLearning'. The term 'very short' did not come up explicitly in all interviews, but one of the synonyms, 'bite-sized', 'two minutes', '15 min', '20 min', or '30 min', did show up in all interviews. It is interesting that, in four cases, there are concrete numbers, but probably it is just a question of language that makes a difference. In any case, the eLearning needs to be short. The only case where the topic did not come up is Case 7. On the one hand, this could be a signal that it was lower on the priority from his point of view in the automotive sector, but there is a second explanation. The largest project and most 'scary', as he called it, was transitioning a month-long instructor-led training into eLearning using tablets. We asked for verification as to whether the students are still using the tablets and he was sure that this is the case and he even added additional thoughts, saying "I still have contact with students that are still using their tablets, or have updated their tablets. So, I would say, I think they used them every day in the classroom, yes, because it was required, but I think

they understand that this is a new tool that we need to start feeling comfortable with." This is not explicitly using the word short, or any other indication of the eLearning and we did not ask the specific question of how the eLearning is structured, but it sounds logical that people only use an eLearning tool if they can easily access the learning, which requires short snippets. But to be sure around this statement for the automotive sector, further research is needed.

4.2 Analysis Regarding Research Question 2: What is the Experience from the Automotive Industry Beyond the General Findings Across the Sector?

Overview. The automotive case C7 is special from its HR organisation. In all other cases, there is a VP with a strategic mission in HR who drives the execution of development and learning. In Case 7, a director level executive with more technology learning focus is responsible for the development and learning department. With this setup, this case adds a more detailed insight into each of the themes that came up across all cases. Those insights are, in general, confirming and adding the details to the cross-case findings of all cases, but in other aspects they give special insights from this case that could be helpful for the automotive sector.

Uniformity. Starting to investigate the details of C7, it is important to keep in mind, as already mentioned, the background that I7 describes as their experience with eLearning being "from a technical side". One of the big examples he mentions where he used e-Learning is a large transfer of a "nine-month hourly program, 900 h, nine-month total […] and I took that curriculum and put it online." His statement is that this was "scary at first", but then he elaborates on user feedback with "they saw how, this created consistency, standardisation and students then, they really got in line with the whole approach." It is interesting that consistency and standardisation are mentioned in this case as an important outcome of the usage of eLearning, to be summarised with 'uniformity'. He states that they even had, prior to the introduction of eLearning, negative feedback from users, that "they received something different being in the third shift class than a first shift class. It is a consequence from using eLearning that this gets solved." He makes an impressive example that shows why this is really important in automotive and maybe similar industries where uniformity is key, as he explains the history in automotive: "Judy's method of changing a tyre might be different than Mike's or Joe's. But the tyre still needs to hold there, it still needs to not go flat, it still needs to be put on the vehicle the right way, everything torqued, all of the processes need to be the same." eLearning created a new standard, that, in the end, significantly increased uniformity because processes and hand movements of students became standardised and, with this, increased the quality of work. He even further investigated results of teaching of the instructors and realised that, in general, instructors are not reaching the whole class as, according to his opinion, "there's ten users, there might be ten different ways to touch them, and you have to figure out the common ground", and most instructors ultimately reach six to eight. But worse, he states that, based on age, one method may work today but not tomorrow, which begs the question as to what the instructor is really changing

based on the audience. eLearning seems to be, from his view, much stronger as it can be developed taking lots of user needs into consideration.

Simulations. When talking about the future, I7 stresses that the personalisation makes sense, as also highlighted in the cross-case analysis, but he also mentioned something very specific to automotive or any similar sector. His example was from the military, where obviously pilots exist that are using simulations and 3D glasses that allow to simulate any movement or repair, and users do not need to know anything at all as they are guided by the tool. But, besides the strength of this approach, he said "I'll never forget it, cause I've never seen it again. It was a green line that walked me right to the path where this bolt resided." He elaborated further on this and suggested 3D simulation for all their products as a potential solution.

5   Findings and Discussion

The objective is to explore which concepts in eLearning increase the acceptance in organisations. This explorative study also lays the foundation for future researchers to build upon our findings. Furthermore, it also identifies areas for organisations to improve their innovation process embedding eLearning concepts that are more effectively driving product adoption.

5.1   Concepts to Improve Organisational Adoption

Immediate. The request for immediate eLearning while using a product is not new. The correct term in practice and academic research is ubiquitous, and one of the characteristics of ubiquitous learning is the term 'immediate' [48].

uLearning is a new term that came up some years ago besides eLearning [2–4] based on the development of ubiquitous computing. Ubiquitous computing is a new trend that allows small computing units or wearables to be always available to the user [48, 49]. When speaking about eLearning in a context of ubiquitous, there are two different notions to be differentiated. On one hand, the term uLearning is used for eLearning that is available everywhere, for example, using learning on a PC, web-browser, mobile phone or tablet, and seamlessly having the same immediate available learning experience. The second way of uLearning is eLearning that is using ubiquitous technology, for example, an RFID chip that is suddenly close to somebody and triggers an eLearning unit.

In the context of the interviewees, they did not ask for ubiquitous technology, but just to always have access to eLearning when they have a question. This means the trigger of 'immediate' is not technology, but a problem an employee has with a product, and he now wants to have access to eLearning. For the praxis, this means the request needs to build in or bundle eLearning into any product or solution to create ubiquitous availability of eLearning.

Short eLearning. The second identified finding is the suggestion to move to short eLearning. Short is suggested, based on our interviews, to be between 15 min and two hours. The findings do not indicate if there is in general a perfect length, and future

research could build upon the concrete examples. This finding should have immediate impact in practice, as it was a strong focus in all cases, and it is relatively simple to be implemented. On the other hand, it is not surprising from an academic point of view. There is already research indicating that the experience of eLearning plays a role [50] and of the perceived usefulness [13], which is the context in which the interviewees described the need of short duration. But, furthermore, there is also research around the length of eLearning, indicating that too long is not good [51]; the length must be the right one [52] and research also suggests it should be split into modules [53]. Based on our findings, there is the immediate need for organisations to implement the recommendations around length and for the academic side to continue the research in this area.

The Earlier the Better. It is surprising, that a lot of research around organisational product adoption starts with the awareness phase and usually ends with adaption [17]. And the first phase is usually the phase where people are becoming aware of a product and then moving forward to the real decision to buy and then to adoption. In our research, most interviewees suggested that a small piece of eLearning should be positioned much earlier, for example, during the hiring process was mentioned, such as university or school. This statement, in general, is supported by the research of Pisano [54], who saw indication in the production process that early exposure to new technologies could increase the adoption speed later on. Besides the early work on Pisano [54], there is also more recent research [55] indicating that additional points in time besides the traditional findings are helpful. The fact that this topic comes up in research around eLearning can lead to the conclusion that eLearning is currently dramatically changing the product adoption process. The interviewees who suggested the exposure to early learning knew that their request of teaching concepts early is now possible, as short eLearning is now available. This suggestion is of more strategic nature but thinking of the large companies of this study it may be realistic to increase focus on academic or school programmes. On the academic side, this suggestion extensive new research around verification of the heritage phases of organisational product adoption in relation to eLearning.

5.2 Specific Findings from the Automotive Case

The second objective of this research is to highlight additional findings from the case of the automotive industry. It needs to be stressed that the factors of short and immediate learning also arose as a clear finding, but the following two factors were specific and did not show up in the other industries.

Simulations. The interviewee in the automotive industry had considerable experience also beyond automotive, and stressed that there are other industries, mentioning the military, that are already using simulations a great deal, and he was surprised that the automotive industry is not using simulations in a broad way. When looking into existing research, there is indeed in other industries considerable around this topic. Much research exists in medicine, where the usage of simulations for learning together with other eLearning methods is a big field of research. When looking into the details, it seems this could be a huge new solution in the automotive industry. The proposition

includes delivering any new car with all the needed simulations for technicians together with the appropriate eLearning. Another proposition are simulations of how to use the increasingly complex programmes used while driving and navigating a car.

Process Improvement. A key finding not only for the automotive industry is the experience that eLearning helps increasing process uniformity and, consequently security, as one instructor never explains a process and details exactly in the same way as another. Human experience and other factors play a role in how things are explained. But, in the current example, the uniformity significantly increased. Most impressive is probably that even users appreciated the fact that the explanations were uniform compared to explanations from multiple instructors across a long timeframe. The interviewee did not use NPS [56], but had statements available from users.

Transferability to the Mobility Industry. The findings above are an indicator that eLearning and its consequent provisioning in all areas could not only significantly change the quality of processes, but probably also the satisfaction of employees in various areas of the process chain. And as interviewee I7 mentioned that he has seen simulations in his career earlier in the airline industry, there is also verification necessary whether the current findings do not allow a general transfer to the whole mobility industry in total.

5.3 Synopsis

We outlined in the above sections that we found answers to both objectives. The findings of the need for short and ubiquitous learning in the sense of immediate availability together with the request for simulations and the suggestion of expected process improvements proposes the question regarding an innovative solution to accomplish all together. Instead of the typical product lifecycle, which is product-focused, as shown in Fig. 1, we suggest embedding eLearning with product innovation.
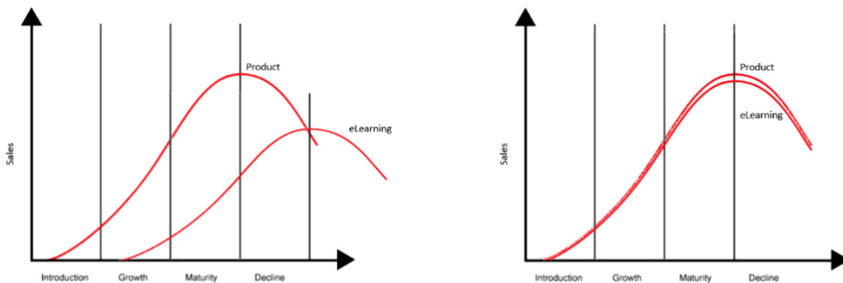

Fig. 1. Typical current lifecycle of a product and the suggested product lifecycle showing a curve where the product development includes eLearning

This means short, ubiquitous available learning units in which simulations of complex procedures could be directly included into any product. A user just uses the product, and, when there is a problem, the required eLearning is available. Or if a user wants to

learn upfront, they can do this as well. This could be an innovation that changes the existing product lifecycle models in a big way. This combination of product and eLearning offers additional value to any product manufacturer as it delivers extensive data. The evaluation of the eLearning usage with AI can deliver valuable data back into the production process. Developers will receive data as to which parts or processes of their products caused questions and needed learning and can improve and even verify their improvements.

6 Conclusions and Outlook

This current research shows that eLearning is used today in many industries and considerable experience exists in organisations on how to use eLearning better [1]. The results suggest that organisational product adoption could significantly improve if companies would provide a more holistic and conceptualised approach around the needed skills.

The key idea is to provide short and ubiquitous availability of eLearning packages to enhance product adoption. In the short term, it should be possible to redesign eLearning to short modules and make them available inside products or on mobile devices. A strategic suggestion could be a full integration of any learning into products. Separate to this, early contact with products could be another important factor, meaning short exposure in university or school level. This is probably not a short-term approach, but stresses once more that the discussion around life-long-learning is key.

Detached from those suggestions across all industries, the current research also showed specific results for the mobility industry. The experience of increased uniformity is a strong statement to rethink across the board as to whether instructor-led training in the process-related subjects is still up to date.

Future research should continue to investigate new ideas around innovation in product adoption using any new ways of eLearning. It will remain important to research both the external client perspective around innovation as well as the internal perspective from the product manufacturers. The mobility industry may benefit from broader quantitative research investigating where simulations may be used.

Appendix

Table 3. Details of interviewees

Interv.	Expertise
I1	Director, HR Graduate Programme, Fortune 500, Distribution Sector, 2 years Director, Sales, Fortune 500, Distribution Sector, 4 years Director, Global Education, Fortune 500, Distribution Sector, 4 years Manager, Strategic Alliances, Fortune 500, Distribution Sector, 2 year
I2	VP, Learning & Development, Consulting Company, 4 years Director, Learning, Fortune 500, 2 years Manager Consulting, 4 years
I3	Manager Training, HR, Fortune 500, Medical Care, 2 years CEO and Co-Founder, eLearning Company, 2 years Global Learning Development Manager, Consulting, 2 years Learning Manager, HR, Banking, 2 years
I4	Senior Director, Global HR, Medical Products, Fortune 500, 4 years Senior Director, HR Research, Medical Products, Fortune 500, 4 years HR Strategic Business Partner, 2 years HR Director, Mergers and Acquisitions, 1 year
I5	VP, Learning & Development, Fortune 100, Hospitality, 2 years SVP, Culture & Talent, Fortune 100, Hospitality, 2 years VP, Human Resources, Fortune 500, Hospitality, 2 years Training Manager & Learning Coach, 4 years
I6	SVP, Chief People Officer, eLearning company, 6 years Chief People Officer, Security Software, > $300M, 6 years VP, HR, various areas, Software, Fortune 500, 6 years Sr Director, HR, Software, Fortune 500, 3 years
I7	Learning Manager and Quality Auditor, Automotive, Fortune 500, 5 years Associate Director, Learning Company, $4.4M, Automotive related, 7 years Manager, Learning and Development, Engineering, $4.5B, 4 years
E1 Expert	Director at Learning Institute, Large University in US, 3 years to date EVP, Sales and Marketing, eLearning Company, 3 years VP, Strategic Partnerships, Project Management Company, 3 years
E2 Expert	Ed. D., Executive Director, Talent Strategy, Large University, US, 4 years Executive Professor of Education Policy, Large University, 4 years Chief Strategy Officer, University Global Network, Large University, 7 years Senior Strategist & Market Development Officer, Large University, 4 years
E3 Expert	CEO, Founder, eLearning Company, 26 years Learning and Performance Consultant, 5 years

Details of Interviewees

References

1. Johansen, J., Jan-Pries-Heje, J.: Software process improvement (SPI) manifesto. Softw. Qual. Prof. **12**, 12–19 (2010)
2. Kumar Basak, S., Wotto, M., Bélanger, P.: E-learning, m-learning and d-learning: conceptual definition and comparative analysis. E-learn. Digit. Media **15**, 191 (2018)
3. Sangrà, A., Vlachopoulos, D., Cabrera, N.: Building an inclusive definition of e-learning: an approach to the conceptual framework. Int. Rev. Res. Open Distance Learn. **13** (2012)
4. Liao, H.-L., Lu, H.-P.: Richness versus parsimony antecedents of technology adoption model for e-learning websites. In: Li, F., Zhao, J., Shih, T.K., Lau, R., Li, Q., McLeod, D. (eds.) ICWL 2008. LNCS, vol. 5145, pp. 8–17. Springer, Heidelberg (2008). https://doi.org/10.1007/978-3-540-85033-5_2
5. Li, F.W.B., Lau, R.W.H., Dharmendran, P.: A three-tier profiling framework for adaptive e-learning. In: Spaniol, M., Li, Q., Klamma, R., Lau, R.W.H. (eds.) ICWL 2009. LNCS, vol. 5686, pp. 235–244. Springer, Heidelberg (2009). https://doi.org/10.1007/978-3-642-03426-8_30
6. Lee, L.: Quality Assurance of Web Based e-Learning for Statistical Education, pp. 429–438. Physica-Verlag HD, Heidelberg (2006). 978-3-7908-1709-6
7. Harman, K., Koohang, A.: Open source: a metaphor for e-learning. Inf. Sci. Int. J. Emerg. Transdisc. **8**, 75–86 (2005)
8. Derouin, R.E., Fritzsche, B.A., Salas, E.: E-learning in organizations. J. Manag. **31**, 920–940 (2005)
9. Chen, T.-L.: Effective eLearning in organization: exploring e-learning effectiveness perceptions of local government staff based on the diffusion of innovations model. Adm. Soc. (1974)
10. Paul, T.V.: An evaluation of the effectiveness of e-learning, mobile learning, and instructor-led training in organizational training and development. ProQuest Dissertations Publishing (2014)
11. Halston, A.: Training content delivered via video capture and an individual's self-efficacy and task-value. ProQuest Dissertations Publishing (2014)
12. Hill, E.R.: Elearning across generational boundaries: a study of learner satisfaction. ProQuest Dissertations Publishing (2017)
13. Lee, Y.H., Hsieh, Y.C., Chen, Y.H.: An investigation of employees' use of e-learning systems: applying the technology acceptance model (2013)
14. Sorgenfrei, C., Smolnik, S.: The effectiveness of e-learning systems: a review of the empirical literature on learner control. Decis. Sci. J. Innov. Educ. (Online) (2003)
15. TSIA. https://www.tsia.com/blog/laer-explained-a-new-customer-engagement-model-for-a-new-business-era
16. Zander, U., Kogut, B.: Knowledge and the speed of the transfer and imitation of organizational capabilities: an empirical test. Org. Sci. J. Inst. Manag. Sci. **6**, 76 (1995)
17. Ettlie, J.E.: Adequacy of stage models for decisions on adoption of innovation. Psychol. Rep. **46**, 991–995 (1980)
18. March, J.G.: Organizations. Blackwell Business, Oxford (1993)
19. Shi, X., Li, F., Bigdeli, A.Z.: An examination of NPD models in the context of business models. J. Bus. Res. (Online) (2016)
20. Rogers, E.M.: Diffusion of Innovations. Free Press, Ann Arbor (2003)
21. Frambach, R.T., Schillewaert, N.: Organizational innovation adoption: a multi-level framework of determinants and opportunities for future research. J. Bus. Res. **55**, 163–176 (2002)

22. Frambach, B., Nooteboom, W.: Adoption of a service innovation in the business market: an empirical test of supply-side variables. J. Bus. Res. **41**, 161–174 (1998)
23. Hsu, C.-L., Lin, J.-C.: Factors affecting the adoption of cloud services in enterprises. Inf. Syst. e-Bus. Manag. **14**(4), 791–822 (2015). https://doi.org/10.1007/s10257-015-0300-9
24. Salum, K.H., Rozan, M.Z.A.: Conceptual model for cloud ERP adoption for SMES. J. Theor. Appl. Inf. Technol. **95**, 743 (2017)
25. Kinuthia, J.N.: Technological, organizational, and environmental factors affecting the adoption of cloud enterprise resource planning (ERP) systems (2015)
26. Chang, I.C., Hwang, H.-G., Hung, M.-C., Lin, M.-H., Yen, D.C.: Factors affecting the adoption of electronic signature: executives' perspective of hospital information department. Decis. Support Syst. **44**, 350–359 (2007)
27. https://hbr.org/2015/06/you-need-an-innovation-strategy
28. Oke, S.A.: A literature review on artificial intelligence (2008)
29. Gupta, N.: A literature survey on artificial intelligence (2017)
30. McCarthy, J., Minsky, M.L., Shannon, C.E.: A proposal for the Dartmouth summer research project on artificial intelligence - August 31, 1955. AI Mag. **27**, 12–14 (1955)
31. Russell, S.J.: Artificial intelligence: a modern approach. VLeBooks, Hull (2010)
32. Stanford University. https://ai100.stanford.edu/
33. Greg, B.: In my end is my beginning: elearning at the crossroads. TOJET – Turk. Online J. Educ. Technol. **15** (2016)
34. Sun, P., Finger, G., Liu, Z.: Mapping the evolution of elearning from 1977–2005 to inform understandings of elearning historical trends. Educ. Sci. **4**, 155–171 (2014)
35. Eisenhardt, K.M.: Building theories from case study research. (Special forum on theory building). Acad. Manag. Rev. **14**, 532 (1989)
36. Yin, R.K.: Case Study Research: Design and Methods. Sage, Thousand Oaks (2003)
37. Patton, M.Q.: Qualitative Evaluation and Research Methods. Sage, Newbury Park (1990)
38. Given, L.M., Knowledge, S.: The Sage Encyclopedia of Qualitative Research Methods. Sage, Los Angeles (2008)
39. Lavrakas, P.J.: Encyclopedia of Survey Research Methods. Sage, Los Angeles (2008)
40. Poon, P.-L., Yu, Y.T.: Procurement of enterprise resource planning systems: experiences with some Hong Kong companies, **561** (2006)
41. Warner, M.: Culture and management in Asia (2003)
42. Training Industry. https://trainingindustry.com/top-training-companies/it-and-technical-training/2019-top-it-training-companies/
43. Yin, R.K.: Case Study Research: Design and Methods. Sage, Los Angeles (2009)
44. Jick, T.D.: Mixing qualitative and quantitative methods: triangulation in action. Adm. Sci. Q. **24**, 602–611 (1979)
45. Denzin, N.K., Lincoln, Y.S.: The Handbook of Qualitative Research. Sage, Thousand Oaks (2000)
46. Smith, L.R., Kleine, P.F.: Qualitative research and evaluation: triangulation and multimethods reconsidered (1986)
47. Aarikka-Stenroos, L., Jaakkola, E., Harrison, D., Mäkitalo-Keinonen, T.: How to manage innovation processes in extensive networks: a longitudinal study. Ind. Mark. Manag. **67**, 88–105 (2017)
48. Saadiah, Y., Erny Arniza, A., Kamarularifin Abd, J.: The definition and characteristics of ubiquitous learning: a discussion. Int. J. Educ. Dev. Using Inf. Commun. Technol. **6**, 1 (2010)
49. Sakamura, K., Koshizuka, N.: Ubiquitous computing technologies for ubiquitous learning (2005)
50. Heather, K., Jennifer, K.: Has e-learning delivered on its promises? Expert opinion on the impact of e-learning in higher education. Can. J. High. Educ. **38**(1975), 45 (2008)

51. Mayer, R.E.: Cognitive theory of multimedia learning. In: Mayer, R.E. (ed.) The Cambridge Handbook of Multimedia Learning (2014)
52. Costley, J., Fanguy, M., Lange, C., Baldwin, M.: The effects of video lecture viewing strategies on cognitive load. J. Comput. High. Educ. **33**(1), 19–38 (2020). https://doi.org/10.1007/s12528-020-09254-y
53. Mayer, R.E., Chandler, P.: When learning is just a click away: does simple user interaction foster deeper understanding of multimedia messages? J. Educ. Psychol. (Online) (2001)
54. Pisano, G.P.: Learning-before-doing in the development of new process technology. Res. Policy **25**, 1097–1119 (1996)
55. Szulanski, G., Ringov, D., Jensen, R.J.: Overcoming stickiness: how the timing of knowledge transfer methods affects transfer difficulty. Org. Sci. J. Inst. Manag. Sci. **27**, 304 (2016)
56. Ziegler, A., Peisl, T.: The value of a net promoter score in driving a company's bottom line: a single-case study from IBM training services. In: Yilmaz, M., Niemann, J., Clarke, P., Messnarz, R. (eds.) EuroSPI 2020. CCIS, vol. 1251, pp. 151–161. Springer, Cham (2020). https://doi.org/10.1007/978-3-030-56441-4_11