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Published in:
Proceedings of the 47th SEFI Annual Conference

Publication date:
2020

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Keller-Andreasen, I., & Helth, P. (2020). Innovating exams design in lifelong learning New Exam Design - Another Way of Learning. In *Proceedings of the 47th SEFI Annual Conference* (pp. 627-638). SEFI.

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Innovating exams design in lifelong learning
New Exam Design – Another Way of Learning

SEFI 2019 Conference

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Conference Key Areas: Lifelong learning. Integrated learning environments for the digital native learners. Strong demand for democratic involvement in educational processes

Keywords: Transfer; Exam and assessment design; Occupational context; Learning in practice, Transformational learning; Digital media.

1 ABSTRACT

The aim of creating new exam designs is to increase the impact of learning in diploma programmes in continuing and further education[1]. By developing new designs we create situations where the student can demonstrate the integration of theoretical knowledge in their practical experience, as well as their inter- and transdisciplinary capabilities[2]. The ruling hypothesis is *that an in-depth involvement of the student's occupational context supports and develops active transfer and lasting learning*[3]*.* Six prototypes have developed mixing exam design i.e. individual oral exams with audio or video clip or pitches, group exams, and experiments/interventions in the occupational context. Subsequently, we have been evaluating the prototypes in relation to the impact of the learning process compared to new competences and abilities relevant for the students' practice. The results show that by bringing the occupational context of the students practice into the "room of exam", support the transformational learning, providing the external examiner and the examiner a better basis of assessment regarding the students' practice based competences and abilities. The didactic used has enabled the students to practice and experiment, during classroom teaching and between the classroom setting in the students' own practice, together with peers or co-students. Moreover, learning experiences using digital media in exams have proven to be relevant for exams within further education.

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[1] *Continuing education is characterised by students having a full-time occupation outside the university, and the educations in focus in this project are Diploma-programmes. The programmes are related to level six of the Danish Qualifications Framework of lifelong learning which is based upon the Bologna framework (Ministry of Higher Education and Science, 2018)*

2 Nygaard, Courtney & Frick 2011; Ledelseskommissionen, 2017

3 Walgreen, 2009; Andersen & Tofteskov, 2016; Laursen & Stegeager, 2017, Helth 2018

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2 INTRODUCTION

The innovation of new designs of exams has taken place in continuing and further education programs at DTU the Technical University of Denmark; programs where the students work full time in private and public enterprises. In this context, exam is regarded as an integrated part of the learning process in the programs, focusing competencies at level six of the Bologna framework, which includes the capability to handle complex and development-oriented situations in work contexts.

The aim of the presented project is *to increase the impact from educational contexts to practical contexts through transfer and transformative learning* when the design of the exams facilitate exam situations where the student can demonstrate the integration of theoretical and methodological knowledge in their practical experiences. Thus, bringing more value for the student and the labour market. The aim is then to explore how innovation of exam designs can improve the students' opportunities to use what they have learned in the education, contrary to many educational programs, where the focus is primarily on the student's exam grades (Vince 2002, Gray 2007, Zundel 2013)

The consequence is that learning in continuing education are mostly based on the literature relevant for the learning subjects, combined with teaching theoretical and methodological skills in the classroom, and the cases the students bring into the classroom. This combination of teaching, learning and facilitating seems to be working well in the classroom due to the high scores; however, the current exam form is not incorporating the occupational context of the students (Schön 1983). To focus on the abilities to use new competences in practice, students need to work differently with their learning than they often do in further educations.

The project unfolded in this article has explored new ways for assessment to address the needs for exams as an integrated part of learning processes in future programs in continuing and further education at DTU. Shortly, the impact of exploring the new design of exam seems to underline that the teacher’s support of learning by training methods is relevant for a professional and organisational practice. This means a learning process that reinforces transformative learning rather than transfer. A transformation of practice does not happen through theoretical knowledge. The student has to train and rehearse new competences in practice, if practice has to be changed.

2.1 APPROPRIATE CONTEXT AT THE UNIVERSITY AND IN STUDENTS’ PRACTICE

The project’s experiments have taken place within six different Diploma programmes for continuing education at DTU.

Continuing education in Denmark is characterised by students having a full-time occupation outside the university. The programmes at this level are related to level six of the Danish Qualifications Framework of lifelong learning which is based upon the Bologna framework (Ministry of Higher Education and Science, 2018).

This means that the students work in private and public enterprises and need to develop new competencies in order to handle more and more demanding job situations. Thus, the exams are not a pure assessment of explicit knowledge but seen as part of the learning process as the final learning outcome includes the capability to handle complex and development oriented situations in work contexts in a reflective manner.

The reasons to innovate the design of the exams are multiple. The trends in postgraduate education in Europe are that the labour market is more complex, and demands more advanced training and ongoing development, including technology and technological applications, more integration of theoretical knowledge with the practice experiences, inter- and transdisciplinary capabilities, to mention some (Nygaard, Courtney & Frick 2011; Ledelseskommissionen, 2017). In addition to these trends, the implementation of constructive alignment at DTU Diploma as a concept and the sheer increasing number of students calls for development of new forms of examinations and assessment.

2.2 CONCEPTUAL FRAMEWORK FOR THE NEW DESIGN OF EXAMS

The courses included in the project are part of the Diploma in Leadership which is a national education offered to professionals and postgraduates as part of the Danish Continuing Vocational Education programmes. The focus is on personal leadership and management within a complex organizational context. Common for the Diploma-programmes is the structure with 30 ECTS compulsory courses, 15 ECTS elective courses, and a final 15 ECTS thesis.

The students following these programmes are typically leaders to be or leaders of teams, departments, organisations, projects or processes in public, private and NGO organisations. The learning outcomes are as mentioned above formulated according to the Bologna framework. A typical exam design for a course (compulsory as well as elective) is individual and a combination of a written synopsis/assignment and an oral presentation followed by reflection and discussion to put the analysis, conclusions and actions into perspective.

Among others, the following aspects are important for transfer, learning and use of new competencies in the daily work life (Walgreen, 2009; Andersen & Tofteskov, 2016; Laursen & Stegeager, 2017, Helth 2018):

1. The students are brought into situations that create a field of learning in their daily job context
2. The job context gives the necessary potential and resources to practice the learning
3. The job context has a culture of change that inspires and supports innovative approaches, i.e. an acceptance of making errors and openness towards difficulties, challenges and dilemmas
4. There are communities of practice and social groups with an educational framework, where reflections and knowledge sharing are an important part of the interactions in the daily life in the organisation
5. There is a possibility to make systematic reflections upon the application of, for example, written reports

These factors encourage a closer connection between students at the university and their practice in the companies. Thus, teachers have to establish better circumstances for the learning context throughout the programmes and the final exam. In the project, the context creation took place through the teacher's organising of study groups, room for experiments, facilitating role-plays, sometimes combined with written reflections in blogs or logs. Bringing the occupational context into the "room of exam" could be done in several ways for example through group exams or exams taken place in the students' workplaces, recording the students written and/or oral presentation in relation to the employees, colleagues, managers etc. Below we unfold the six prototypes used in different types of exams.

2.3 SCIENTIFIC LITERATURE IN THE FIELD

As we have observed in the project, transformative learning can change students' social practice and sometimes their identities (Lave and Wenger 1991, Wenger 1998 Mezirow 1992, 2009, E. Taylor 2007, 2009). The background for using transformative learning is a study unfolded in leaders' practice in 10 companies in Denmark, where the empirical study was based on action research (Helth 2018, McNiff and Whitehead 2011). The purpose was to create a learning environment that promoted leaders' potential to obtain the transformation they wanted and needed.

As mentioned above, transformative learning can change students' practice and enable a more direct training and experimenting with practice. A student does not learn his or her profession reading books alone, but also has to practice. Students who participates in continuing education often focus on how the knowledge as a 'product' can be transferred from the education system unto the working practice. However, this does not give the student sufficient competences. Transfer is based on a non-personal kind of learning, which consists of learning far away from the organisational practice (Helth 2011).

More attention has to be on transformative learning (Mezirow 2000), which includes a creative learning process where knowledge emerges in new forms, depending on different events and leadership interventions. Researchers have argued that transformative learning focuses more specifically on connecting theory to practice (Harris et al 2008). Hence, transformative learning may be more relevant in accordance to an organisational practice than learning as transfer that focuses on the individual learners' ability to bring knowledge from one context to another.

However, there are barriers to enable learning in an organisational practice, if learning theories are dominated by the notion of transfer. In contrast to transfer, transformative learning seems to have different advantages over learning in practice. To fulfil this target, we have used three didactic "rooms of learning", see figure 1. The figure shows the combination of teaching in the classroom, exercises in the classroom (laboratorium) and experiments in practice (practicum).

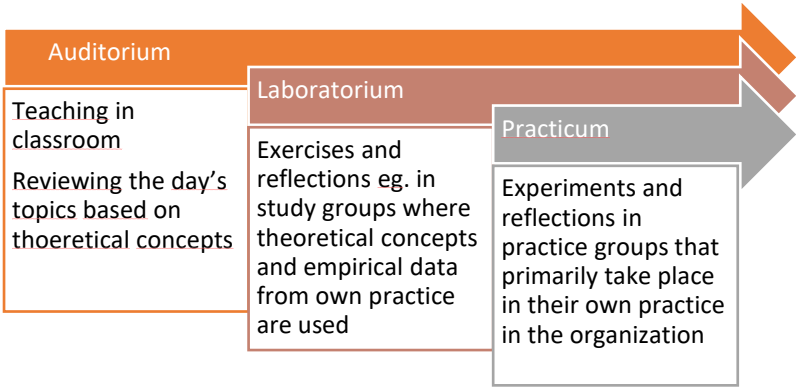


Figure 1 Three didactical "rooms of learning" (Dauer, Stegeager, Willert 2011, 2019)

3 HYPOTHESIS AND METHODOLOGICAL DESIGN OF EXAMS

The goal of the project is to develop analogue and digital prototypes and combinations of the two, with a primary focus on inviting the practice of the students into the exam situation. Additionally we want to contribute to a higher level of professionalism for the students and educators in an increasingly digital world.

The hypothesis for the innovative work *is that an in-depth involvement of the student's occupational context supports and develops active impact and lasting learning through transformative learning and learning environments in the classroom and in the organisational practice* (Walgreen, 2009; Helth, 2018).

As the students are working in different contexts and the different programmes have different learning objectives, we cannot generalise results. Actions that work well in a course in "Economic Leadership" based upon accounting principles and economic theory in a leadership perspective, will not automatically work as well in a course in "Management and globalization". Similarly, we cannot copy the best practices from our project into other countries and apply the experiences directly from the Danish programmes. This is due to differences in culture and tradition, legislation and systems.

The purpose is to explore the knowledge of how individuals and groups are making sense of the different theories applied to the challenges in the occupational context, and how we as educators can support transformative learning in further educations.

As the exam is an integrated part of the learning process, and is the formal framework for assessing the knowledge gained, the acquired skills and the acquired competencies, we must focus on assessment of the competencies that includes the capability to handle complex and development oriented situations in work contexts in an increasingly digital world. Thus, we must establish a "room of exam" where the students must demonstrate their competencies of acting in complex work contexts in a reflective way.

Due to the Bologna framework in Denmark, we always use learning objectives in relation to knowledge, skills (abilities) and competencies. Below we will unfold the six prototypes in our project in relation to the learning objectives.

3.1 DESIGN OF EXAM

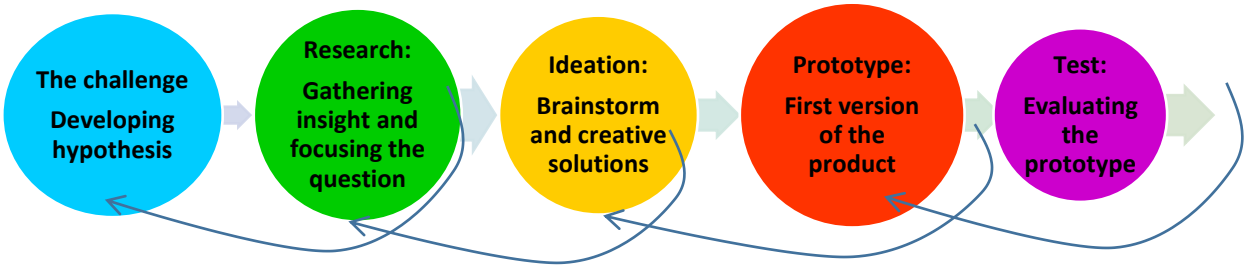
The project consists of three stages:

- Exploring the possibilities for new exam designs and designing prototypes that comply with current academic regulations for the diploma programme
- Completing a number of exams based on the new prototypes
- Evaluating the new designs with students, teachers, heads of studies and – if possible – with the employers of the students

In the work with innovating exam design, we are inspired by the ideas of the Design Thinking Process (IDEO[4]) as depicted in figure 1 and start by forming a hypothesis, "the **challenge**". Next, we focused on the question and **researched** the audience we designed for, i.e. the students, and began the **ideation** process coming up with creative solutions. Building a representation of one or more of the ideas, we created several **prototypes**, which we subsequently tested and evaluated. The results help revise the research questions, fuel the creativity for new solutions, and refine the prototypes.

[4] https://www.ideo.com/post/design-thinking-for-educators

Figure 2 The five stages of the design thinking process. Ref: IDEO https://designthinkingforeducators.com/



In the first part of the project, the teaching staffs of the diploma programmes have participated in a workshop with the purpose of designing new prototypes. They have subsequently been encouraged to volunteer and test the new exam forms in either the semester fall 2018 or spring 2019. Evaluation and revising of the new exam forms was carried out during summer and fall 2018, winter and spring 2019 in a continuous loop process, following the ideas of the Design Thinking method.

Thus, the project developed as we experimented with different types of alternatives to the most used combination exam, where the student has an oral exam based on a written synopsis, concerning a problem relevant for the specific subject.

3.2 EMPIRICAL DATA FROM PROTOTYPES OF DESIGN OF EXAMS

Data for the project consist interviews with students, teachers, and employers and observations from courses, exam situations and teaching staff meetings and workshops. A number of compulsory and elective courses are part of the project (table 1).

*Table 1Overview of courses in the project in 2018-19, * not included in this report, but are test of prototype*

Focal point Subject in the Diploma programme	**Compulsory/ Elective**	**ECTS**	**Exam**	**#students**	**Status summer 19**
Research the field Technical experiment Management and Globalization	Elective	5	Individual Oral with audio clip + written assignment	6	Prototype Testning
Technical experiment bigger scale Organizational and management communication*	Elective	5	Individual Oral with audio clip + written assignment	20	New Prototype
Pitch exam Strategic management	Elective	5	Individual Oral with synopsis and video clip	24	Permanent
Practice training Leadership and coaching*	Elective	5	Group exam Oral with video with essay and team reflections	10	Permanent
Training of collaboration Organisation and Processes – Management and Organisation 1	Compulsory	5	Written group exam	14	New prototype
Learning through practice Personal Leadership 1+2 Leadership Communication Professional leadership	Compulsory	2*5	Written group exam + Oral with synopsis based on experiments performed	20	Permanent

3.3 METHODS INVESTIGATING IMPACT OF THE PROJECT

The primary methods for data collection are questionnaires with the aim of uncovering trends, and focus group interviews, as well as individual qualitative interviews, with the aim of uncovering in-depth qualitative data. These methods are combined with observations performed during actual exams. The project participants carry out all project investigations, evaluations and reflections.

The focus of the questionnaires is to explore how the new format of exams works. It consists of a number of questions with special focus on three factors that can explain a substantial part of the transfer taken place, namely **job benefit, transfer climate, and rewards** (Walgreen, 2009). Furthermore, the focus is also on the possibility of the student for integrating theory and practice. Qualitative interviews were carried out with groups of participants guided by semi-structured and open questions to obtain their reflections upon the method, the learning process, and the transfer of theory in to practice.

On the topic of transfer climate, the questions address time available for studying, workload, and possibilities for experimenting with the new skills, which Walgreen points out as the three most important barriers for transfer. E.g. "*How did you find the possibility to work with the video clip/assignment/the intervention*?"

The rewards achieved after completing a course or a whole programme could be financial or personal e.g. fringe benefits, promotion, more responsibility, etc. Researching for the job benefit we asked: "*Did you get any benefits after completing the course? Which? How?".* The students are often not aware of their new competencies. The questionnaire made them reflect when we asked about their experience with integrating theory into their practice. One question was: "*Where did you have bigger learning in relation to the examination*?" followed by optional. The questions posed were focusing on factors that facilitate the transfer mentioned above.

After group exams we conducted an individual interview to explore the individual transfer climate and job benefits as well as learnings. In the last prototype in the project we observed interactions and responses to various exercises as well listen to the dialogues though classes as well as examination. A focus group interview is set up with all teachers together with the Head of studies to collect and share all learnings.

4 FINDINGS IN THE PROTOTYPES

The challenges was to develop analogue and digital prototypes and combinations of the two, with a primary focus on inviting the practice of the students into the exam situation, grounded in the hypothesis: *that an in-depth involvement of the student's occupational context supports and develops active impact and lasting learning through transformative learning and learning environments in the classroom and in the organisational practice.*

The process unfolds in the following descriptions of the prototypes starting with a co-creation with students and explore the technical abilities and challenges of the students and teachers finding the technical and didactical potentials to train practice and collaboration ending up learning through practice. Three of the prototypes are now permanent forms of examination and assessment at the programme. This means that 6 prototypes have been developed into 4 new designs of exam.

4.1 AUDIO/VIDEO PITCH, SHORT WRITTEN ASSIGNMENT AND ORAL EXAM

This development took place preliminary in a course with 6 participants to test the didactical and technical potentials and challenges to put to bigger scale in course with 20 participants. The teacher and the students co-created the prototype to capture the occupational context best and accelerate their learning. It became a combination of an individual oral exam and a video/audio clip accompanied by a short written assignment. This assignment addresses management issues and challenges within the global professional context, and includes a theoretical as well as a practical perspective. The learning objectives set requirements to the case. The oral exam consists of the examination, evaluation and feedback. The form is dialog-based and can have the following content:

- Students oral presentation agenda based on the video/audio clip
- The video/audio clip based on the case will be the starting point. The student will elaborate questions, analyses, reflections, conclusions and perspectives
- Discussions about methodology, applied theory and possibly alternative theory as well as the management-based context.

The co-creation process created a direct connection from translating learning objectives into the occupational context of the students. The teacher was excited as the assessment of the learning objectives, especially concerning the skills and the competencies were built upon a more solid basis. The students could demonstrate their level of knowledge and capabilities and could put conclusions into perspective in their own occupational context based on different scientific paradigms as the required[5] In making the audio clip they had to find a case that demonstrated a cross-cultural issue in their working environment. As they used both the social constructivist paradigm as well as the realistic paradigm, they gave themselves an opportunity to learn even more as the exam unfolded as a dialogue.

The later research showed due to transfer climate that 33% used external networks of interest, had no co-workers as co-students and 100% used their leisure time for the study. The bigger part found the highest level of learning in preparing the exam by themselves, in the group preparation with the teacher as well as in the dialogue at the table. An interpretation of the results is that the learning has increased while at the same time the teacher and external examiner found the format giving a better foundation for the assessment. The average of marks for the exams were “A-“.

Key points and learnings:

- The training in doing interviews and research have changed in the way the students act in a more reflective manner
- The exam form created a stronger commitment from the students
- The technical support of the exam, i.e. the learning management system, must have the necessary functionality and sufficient power to handle the uploading of videos and audio clips
- The teachers must make time for training pitching and scoping as well.
- Didactically, the teacher takes a more facilitating position and put the responsibility to learn the technical capabilities of the student to create the videos and audios.
- Created bigger awareness of management communication and the potential of digital forms of communications channel

[5] Level six requires a reflection of fourth order due to Bologna framework

- Students developed their communications skills and competences in the occupational context afterwards.

Taken the learnings into account the prototype was modified and developed to an individual oral “pitch” exam combined with a written synopsis.

4.2 VIDEO PITCH, NO WRITTEN ASSIGNMENT AND ORAL EXAM

Taken the learnings from the former development of semi digital prototype, the practice training was introduced and developed at another elective subject within the same programme. Thus, most of the students had experienced recording and performing a video pitch. The prototype of the exam is a combination of an individual oral exam and a 3-5 minutes video pitch that addresses how the student understands strategy and strategic leadership and gives a short analysis of a specific strategic challenge of the student. The oral exam consists of the examination, evaluation and feedback. The form is dialog-based and can have the following content:

- Students oral presentation agenda; the video pitch in a broader perspective
- Critical evaluation of theories and methods supporting the strategic leadership
- Most important learning from the course and how the student share the learnings with other members of the organization.

After experimenting and keeping the rules concerning examination, this prototype is now the concept as the student experienced a transformative learning process and a higher capability afterwards. The planning of the course has been changed thus, the students bring the scope of the strategic challenge they want to work with during the course before the course starts to support the transformational learning.

4.3 WRITTEN GROUP EXAM

Parallel to the former process we conduct the development of this prototype in an exclusive course for a management group of 24 persons at a public organisation with about 250 employees. This mandatory course is part of a continued programme to strengthen the professionalism in management and leadership as well as the cross-organizational collaboration. The additional purpose challenges the format of exam that should create a solid ground for evaluation and transformational learning. The new format is a written group exam starting from three defined strategic goals given by the top management.

The groups were formed across the sectors and departments at the beginning of the course, thus they got used to working together, carrying out analyses, reflections and other activities during the classes. Every group defined their own working problem statement and each member analysed the issue from their own perspective using the theoretical frameworks and models of the subject. The group then wrote a joint discussion, conclusion and perspectives based upon the findings. After the exam, they received oral feedback from the teacher. This meeting also served as a room for reflections upon their lessons learned and learning.

The results concerning the transfer climate and learning were that the participants found a high level of learning in the writing process as their reflections emerged in the process, even though they had a big challenge to find time to coordinate. The development of a more professional behaviour as well an increased awareness of

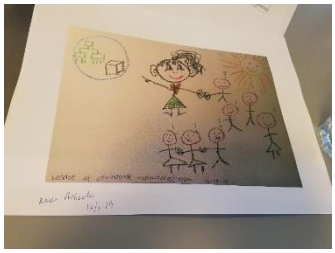
sensemaking and the interdisciplinary leadership have emerges at the organizational level, which show a transformational learning more than transfer.

4.4 ORAL EXAM AND WRITTEN ASSIGNMENT.

The following course for the before mentioned management group explored the learning through practice with focus on professional and personal leadership. The prototype was an individual oral exam and written assignment bounded in experiment in practice performed before the exam.

To get an in-depth involvement of the students occupational context the instructor attempt to create a connection between learning objectives during the classes by setting some requirements for the didactics to create a correlation between the student's own practice, the classroom teaching and the examination assignment that completes the module. A storyboard was design for each class. The three didactical “rooms of learnings”; Auditorium, laboratorium, and practicum (Dauer, Stegeager og Willert 2011 and 2019, Figure 1), were visited, and created a movement through aesthetic performance, that help the leaders to express new thoughts and integrate their experiences in neural networks (Peterson, DeCato og Kolb, 2015). The following research found that leaders learned reflect on the influence of aesthetic performance to reach the recognition of the transformation they achieved. Moreover, they developed new practical based leadership competences with success for themselves and the organisation.

Figur 1 Training methods and communication skills



Figur 2 Illustration during examination

5 PERSPECTIVES

The hypothesis for the work *is that an in-depth involvement of the student’s occupational context supports and develops active impact and lasting learning through transformative learning and learning environments in the classroom and in the organisational practice.* New forms of exams have strengthen the capabilities of the students in their practice. All activities and intentions of the project have been very well received among teachers, students, and organisations. Three prototypes are now permanent practice in the curriculum and has been adopted into catalogue of assessment and exams for the national study programme of Diploma of Leadership.

Concerning the benefits of the new forms of exam being part of the learning, the teaching and learning must be based on action learning and must be well structured by creating storyboards and include time for training of relevant methodologies.

In addition, the organisation has to take responsibility for more emphasis on students’ learning in practice. As the effect of this project documents not only the instructor, but also top managers from the students’ working context, have to be involved and encourage learning at the workplace. The perspective of learning could be a new co-creation of transformative learning between education systems and human resource departments in organisations, thriving for new forms and technologies of transformative learning in organisational contexts *and* in leadership learning programs.

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