

An Agile Process for an e-Training of Trainers on Online Teaching

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Abstract: Assessing As COVID-19 continues spreading in the world, how to keep learning in disruption has become a challenge to the global education community. Effective academic online support services are oriented for both teachers and students. In this context an agile process of "Training of Trainers" has been established to assist teachers designing online resources and e-learning scenarios. In this paper, we provide an overview of the process of e-training of training conducted during the pandemic crisis for University lecturers. We propose a formal description of this agile process based on conceptual models, and analyze activities performed by tutors. These models, evaluated by trainees, promote an in-depth analysis and a detailed description of the tasks performed by tutor's support e-training of teachers.

1 INTRODUCTION

As the on-going COVID-19 pandemic continues to develop in the whole world, many governments closed schools and universities. In addition, these governments implemented an emergency educational support intended to confine students at home, and asked teachers to adjust their strategies to create online courses and deliver them through online communication tools in record time without any previous preparation.

Given the complexity of the tutor's involvement in online courses, it is necessary to well prepare University teachers for their new role through a well-established training process. In this paper we will focus on a formal description of an e-training process of online teachers. The process of training has been qualified as agile, as it was adapted to the context of the various trainees and permitted a continuous improvement of the training design, through frequent feedback loops of iterative training routines.

Further to the training, we have proceeded to the measurement of the process impact on teachers' Performance by taking a survey to check whether the trainees acquire, intended online Tutoring skills and got the opportunity to have faster solutions to problems, and guidance.

The research in this paper is based on the work of the authors who were responsible for e-training of University Teachers (Around 600 teachers) on

mastering design of online courses and online teaching. The objectives of this paper are contributing models for agile Process of e-training of Trainers on online teaching, to build a common understanding for such training processes and to be able to adapt the process to training context and needs.

The paper is structured as follows: In the next section, we will present our research context and objectives. Section three permits to describe the agile training process conducted and the models elaborated. In section 4 we present the way the training process was evaluated, and the lessons learned. We finish our paper by presenting a conclusion and our future work towards this research topic.

2 RESEARCH CONTEXT

In this paper, we conducted a literature review in order to analyze the state-of-the-art of agile process with strong focus on training process description and learner involvement. The agile methodology has been introduced by instructors in academic environment due to the success of agile in industry where students are working with realistic project through which they learn agile concepts more efficiently (Monett, 2013), Therefore in (Stewart, 2009), by drawing up an equivalence table between principles of the Agile manifesto and the pedagogical Environment, authors

showed that Agile methods improves learning outcomes by delivering the just useful material teaching in accordance with variable student's needs. On the other hand, Authors in (Sureshchandra, 2008) insight on the role of agile coach to assist the project team to adopt the agile mindset and reject waterfall methods by following iterations and practices. This was also the case in (Chun, 2004), where an « Agile teaching/learning methodology » was used for teaching technical courses based on Learn by Sharing, Teach How to Learn and Frequent feedback loops that contribute to a continuous improvement of the course design, despite additional effort in process, coordination, teamwork and perceptions in a social context (Stettina, 2013). In a previous work we have proposed a meta-model that constitutes a theoretical framework for describing active e-course and translates a mapping between the techniques used in face-to-face active courses and those used in online courses (Belcadhi, 2015). We have also provided in a previous research work a modelling of the tutor functions in online learning (Belcadhi, 2014). Further to our deep experience in deployment of virtual learning, we can confirm that virtual learning environment does not guarantee the achievement of learning objectives if it is not managed properly and requires an appropriate system design composed by methods, approaches and assessments and specially during pandemic time (Mundiri 2021). Besides, converting face-to-face courses to an online course requires skillful pedagogical adjustments and proper technology support that most of trainers were unaware (Chen, 2021). We therefore observe that an agile coaching may assist inexperienced tutors in this pandemic outbreak

In order to measure the Impact of Agile Coaching on Students' Performance (Rodriguez, 2016) take a survey confirming that students acquire non-technical skills in addition to highly necessary skills of teamwork, communication, and management. Based on the deep literature review that we conducted, we aim, in the current work, to establish UML based conceptual models for an enhanced understanding of the agile process of e-training of trainers for online teaching. This process will describe trainers' tasks. The models can subsequently be used as references for trainers, and as a framework for a better assessment of the work they carry out. Maintaining the Integrity of the Specifications

2.1 Modelling Framework of Agile Training Process

In this work we pose the question how to provide a

description of the stages of a meta training of trainer's process taking into consideration digital pedagogy specificities. A possible answer for this question is offered below. We propose our adopted approach to validate the elaborated Modelling process.

In order to prevent contagion from COVID-19 virus, many measures were taken to ensure for students a pedagogical continuity during confinement by providing online courses via Online Learning platform. The pedagogical team of trainers of trainers, a model to provide distance training for teachers. The pedagogical team is composed of:

- A technical team responsible for the management and administration of a Learning Management System (LMS) platform (Moodle as current solution).
- A national coordinator having for role preparing and supervising e-learning outcomes.
- A department head of virtual education in the University (DVE).
- A team of e-learning correspondents (CEL) assigned to different institutions who assist their colleagues to create their own online course space by providing them technical support, resources, problem resolution and allow each student access to the dedicated space to follow the courses and benefit from educational support services.
- A coordinator of CEL online responsible for coordinating with the previous actors.

At the beginning, the main objective was to give lecturers in a lapse of time (1 week) the most useful tools and techniques to create their educational online space (LMS) and ensure interactions with their students, but we were faced with other unpredictable circumstances and were obliged to remote manage and lead teams with different profiles. Therefore, we must express agility and goodwill in Teaching staff management. Since the scope of this training session should be adjusted to trainers' requirements. So, we propose an iterative and incremental model for e-training of trainers (Figure 1).

Indeed, a model is a simplified representation identifying interactions between various elements. We may identify two main categories "descriptive models" and "Prescriptive models". Descriptive models presents an existing situation, whereas the second type of models represent an ideal solution for a given context. Initially, our approach is descriptive as the study is based on our involvement in an e-learning experience as trainers of trainers. These models can also be considered in a prescriptive way as they establish a theoretical framework which offers guidelines to be followed by a trainer .

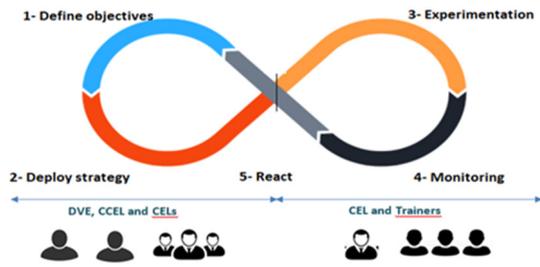


Figure 1: The Meta Training of Trainers Model.

Since we are faced to a project with fixed resources and time and with a dynamic process we have therefore adapted our proceeding quickly and verified the evidence of obtained value in the same iteration.

In our case, the phase of testing was performed twice successively by different actors of the pedagogical team. As a result, the ToT model was based on the following stages:

Stage 1: Define Objectives

The ToT model process starts with the definition of the problem statement that we want to solve. This will form the basis of potential solutions and objectives to reach.

In our case, the main objective is to assist trainers for a period of one week to get some pedagogical and technical skills in order to manage their online course spaces and ensure continuity with their students. These objectives are fixed by the DVE and communicated to the CCEL and CELs.

Stage 2: Deploy Strategy

In the second stage, we shift from identifying objectives to exploring solutions and prioritizing the items. we referred back to the definition of the main objective for describing the content of the training session like technical support, type of pedagogical resources, activities to realize, specific objectives, communication tools, planning of meetings, indicators to be reached and proceeding of the training session.

These items are integrated in a training space course created by the DVE and managed by the CCEL. Hence, all the CELs and the trainers were enrolled in this space towards accessing pedagogical resources.

Stage 3: Experimentation

Now, in this step the conceived strategy will be turned into something tangible which can be experimented on trainers and get their feedback. That's why we focus here on targeted actions and accurate planning to test the running experiments and evaluating them.

Every team of trainers is assigned to a CEL who will assist them, moderate online meetings, communicate with them, answer their questions and undertake significant data about the progress of the training session and report it to the CCEL.

Stage 4: Monitoring

During the monitoring phase, we observed our target users as they interacted with activities, resources and their teams. We verified if targets are achieved, the source of blocking points, the new requirements and skills and how trainers felt throughout the training session. On the other hand, CELs were asked to perform monitoring which consists of checking the degree of achievement of each item of the predefined objectives and detect possible malfunctions by supervising the flow of trainer's posts, the degree of achievement of activities and measuring performance.

Stage 5: React

At the end, the Monitoring phase highlights any flaws or imperfections that need to be improved. This stage may assess the initial objectives, revisit their definition in the first stage or adapt the proceeding through more strategy deployment sessions before attending the expected result. However, the reaction about all kinds of events is done on two levels, the first managed by each CEL who adjusted some minor technical details of the training without affecting the main objectives and the second referring to adapt the training proceeding by revisiting target priorities, adding new pedagogical resources or deploying technical solutions. These decisions are made by DVE after periodic online meetings with CELs and CCEL.

2.2 Modelling Agile Process

We use UML for modeling, specifying, visualizing, constructing, and documenting the components of our system: The online TOT Agile Process.

2.2.1 Use Case Modelling

We are introducing the concept of the use case diagram in UML with a view to specify the expected behaviour of the system without carrying about how it will happen. In this context, the actions performed by actors are described by visual and textual representation (Figure 2).

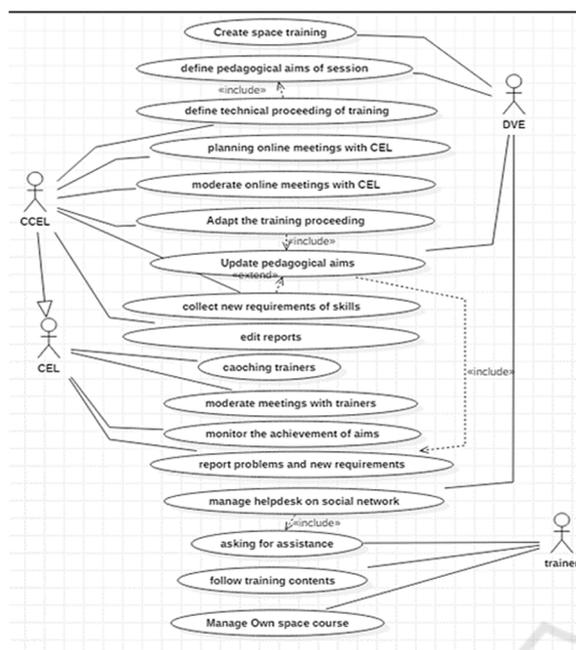


Figure 2: Use Case Diagram of the meta TOT model.

In the following, we present the Use case textual description:

- Use Case Name: e-training of trainers
- Goal: Ensuring pedagogical continuity for trainers and assisting them for managing their space courses
- Actors: DV, CCEL, CELs and Trainers.
- Preconditions: The trainers are enrolled on E-learning platform, the training space is created, and the communication is effected online
- Post conditions
 - collected data from training session,
 - satisfaction survey of trainers,
 - enriched space course for every trainer.
- Normal Flow

The process will follow these steps:

1. Each training session lasted one week; a first version of the training space was allocated with the following contents:
 - Introduction to LMS,
 - Management of the course space,
 - How to add resources,
 - How to use communication tool for interactions,
 - Access control of the course space.
2. A call for subscription is announced for University’s teachers by mailing list and social network. Those who are interested have to fulfill a form with personal information and describe their level of mastering online educational tools.

3. 24 hours before the start of the training session, the CEL’s coordinator send a mail for pre-registered teachers announcing: (i) the program of the training session, (ii) the key date of important events and (iii) the provisional planning of synchronous meetings grouped by institute and moderated by each CEL.
4. Then, every CEL was assigned to a teacher’s team, and he sent them a mail announcing the effective start of the training session, updating the schedule of the synchronous meetings. Finally, he/she saved the list of registered teachers with the title of their course spaces
5. For each training session, 3 synchronous meetings were planned. Each CEL had been asked to send an invitation for this event at least 24 hours before by email and by forum mentioning the communication tool he plans to use, the date and the agenda of the meeting.
6. During the meeting, the CEL is in interaction with teachers responding to their requests about technical or pedagogical proceedings, looking for their expectancy and paying attention to their future needs.
7. All these suggestions and remarks were included in the Minutes (Reports) attached in a first email to the coordinator of CEL and in a second email to the teachers provided with the link of the meeting record and summary of the main topics discussed during the chat.
8. At the end of each meeting (CEL/teachers), the coordinator of CEL collects the various reports of the different teams, made a synthesis and planned an online meeting with CELs in order to discuss the current conduct of the training session.
9. During the meeting (CCEL / CEL), the participants raise topics of faced difficulties, technical problems, and the envisaged recommendations to adapt the pedagogical resources according to the new needs of teachers and included in a report intended to the DVE.
10. The concretization of these tips was tested in the rest of the training session and the degree of the achievement of the predefined objectives were in perpetual control until the next online meeting where actions will be validated or readapted for the next training session.
11. At the end of the training session, participants receive an email announcing the cloture of the session and are asked to fill out an evaluation sheet assessing the program.

2.2.2 Activity Diagram

Activity diagram shows the order in which stages are realized to achieve the use case’s targets. It describes the dynamic aspect of the system, and it shows the transition from one activity to the next (Figure 3).

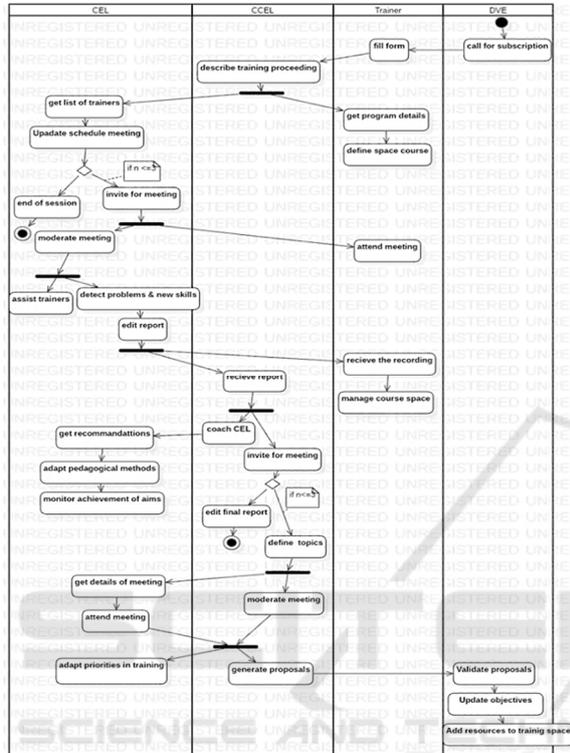


Figure 3: The Activity Diagram of the meta TOT model.

In order to maximize transparency of key information for inspection, we represent the value and the output of sprints by the following artifacts:

- **The product backlog** is all the requirements collected to realize the objectives of the training session like features, functions, improvements, and fixes,
- **The sprint backlog** constitutes all the elements that were selected at the start of the sprint (in sprint planning) with the aim of meet the objective of the sprint and increment the product with new things,
- **The scrum increment** represents all the "done" elements of the current sprint in addition to those already finalized in previous sprints,
- **Definition of done** defines all the criteria that will allow the scrum team to confirm that an item (user story for example) can be considered "done".

Scrum defines ceremonies or events (table 1) that occur inside each Sprint used to create a routine and also to minimize any other meeting other than those predefined.

Table 1: A mapping of artefacts Scrum/online TOT domains.

Scrum domain	Online TOT domain
Product Owner	A department head of virtual education in University
Scrum Team	A team of e-learning correspondents (CEL)
Scrum Master	A coordinator CEL(rotating role within the team)
Development platform	A LMS platform such as <Moodle>
Product	course spaces implemented on Moodle
Product backlog	pedagogical, technical objectives
Sprint	(1 week) is the long development of training session
Sprint backlog	Selected set of predefined objectives
Task	An e-learning activity e.g. animation chat, insert resources

Table 2: The components of the Sprint.

	Initial Objectives of the training session: -Introduction to LMS - Management of the course space -How to add resources -How to use communication tool for interaction -Access control of the course space			
Start	Product backlog	Sprint backlog	Increment	Definition of Done
Sprint 1	N/A	Initial Objectives: -Introduction to LMS -Management of course space	-An user account to the LMS -personal course Space	Every teacher can access his account. Every teacher can define the structure of his space course
Sprint 2	N/A	New features: -How to create accounts for teachers. -How to help teachers access to their course space Initial Objectives: -How to add resources -How to use communication tool for interactions	Increment of Sprint 1 -An user account to the LMS -A personal course Space Increment of Sprint 2 -Video Tutorials and guides -Updated Spaces -Planning's	Access to LMS for all the beneficiaries of the training Enriched course space All teachers attend at least one online meeting All teachers create and moderate communication tools (forum, chat...)
Sprint 3	N/A	New features how to create online assessments how to integrate websites on LMS How to manipulate visioconference tools Initial Objectives: Access control of the course space	Increment of Sprint 1 Increment of Sprint 2 Increment of Sprint 3 -Video Tutorials created Quizz created -created groups of students	-Video Tutorials and guides Quizz are created and integrated websites are integrated -groups and roles affected to course

we have determined the actors in the previous diagrams, we notified that these actors were competent, self-organizing and cross-functional, and we recommend to them which tools to choose to accomplish their work. We, therefore, can consider these actors as a scrum team asked to deliver products iteratively and incrementally, maximizing opportunities for feedback and we propose a mapping between the two domains (table 2).

Table 3: The ceremonies and events of scrum.

Sprint /Level	Event	objective	duration	Actors	tool
I/1 Meta training	Sprint planning	organize the scrum sprint that will be starting.	2 h	DVE CCEL CEL	Mail
	Daily scrum	revealing the blocking points and the state of proceeding	15 min every day	DVE CCEL CELS	Mail social network
	Product backlog Refinement	refine the content of the Product Backlog and organize the next Sprint properly	30 min	CCEL CELS	online meeting
	sprint review	take stock of what item was achieved during the level 2 of sprint and get constructive feedback	30 min	CCEL CELS	Online meeting
	sprint retrospective	thinking about new activities for continuous improvement	30 min	DVE CCEL CELS	online meeting Minutes
I/2 Training of trainers	Sprint planning	Announcing the user stories of the product backlog belonging to the sprint.	N/A	CELS	Mail
	Daily scrum	revealing some technical difficulties and pedagogical requirements	continuou s	CEL trainers	forum on LMS mail
	Product backlog Refinement	Proposal recommendations for refining the content of the Product Backlog for the next Sprint properly	continuou s	CELS	Mail
	sprint review	Verifying the DOD of each item of the sprint planning	15 min	CELS	LMS
	sprint retrospective	proposal of new activities for continuous improvement	continuou s	CELS	LMS

2.3 Scrum Units

Agile methodologies are inspired from the “Agile manifesto”. So, we’ve adapted the “agile manifesto” for “online coach agile manifesto”. We propose an agile process to support trainers to acquire skills by

doing it and helping others do it (Figure 4). Through this paper we have succeeded to value:

1. Collaboration and interactions over communication tools
2. Pedagogical skills over technical skills on LMS
3. Trainer-satisfaction survey over e-learning outcomes
4. React to a new need over Following a plan.

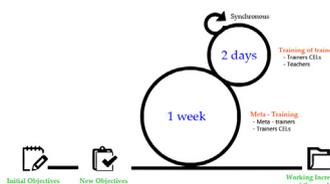


Figure 4: Meta training of TOT model.

3 TESTING OF THE MODEL

We designed a survey that allowed us to validate the established formal modelling for the agile ToT process. The survey has been distributed to learners, enrolled in the training. The models constitute a theoretical framework for conducting the instructional design of Meta-ToT processes.

The research methodology can be divided into three parts. In the first part, we designed and elaborated a questionnaire that allowed us to validate the agile process. In the second part, we conducted the ToT and distributed the questionnaire to learners, who participated in the training. In the third part, we collected information from learners and proceeded to their analysis to permit an evaluation of our pilot test case study and therefore a validation of our Process for ToT. The model that we have adopted permitted us to train around 600 University teachers from our university, belonging to 17 High Education institutions and faculties and enabled us to support them in preparing their lessons on digital media and hosting them in the course spaces created on the distance learning platform.

3.1 Questionnaire: Design and Procedure

A Likert-scale questionnaire has been elaborated and distributed to 600 online learners with the aim of studying the impact of this training process on the learners. The evaluation of this process is supported by quantitative and qualitative data collected through teachers’ surveys.

The survey was composed of 10 items, including questions on the training experience, objectives of the

training session, impact on the new methods of teaching, and acquired skills. The questionnaire was made available online via email or social network at the end of each session of training. We received 190 answers.

The evaluation cohort was mainly composed of junior teachers as shown through the following graph (Figure 5), which shows that the majority of the trainees are assistant professors. This can be explained by the fact that this new generation of teachers is more oriented to the use of ICT in learning and motivated to discover innovative approaches for teaching. Besides this population, is encouraged to attend pedagogical training so that these teachers will be able to better tutor their learners. Also some senior teachers attended the training.

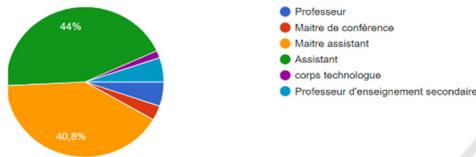


Figure 5: Pilot Cohort profile.

3.2 Data Analysis and Results

In the following we present the results of our conducted evaluation of the agile process of TOT. In this section, we outline the analysis of the answers given by learners to the questionnaire and the obtained results. The results of the questions presented in the questionnaire have been deeply analysed. Responses to all Lickert-scale questions in the questionnaire and concise observations of learners were collected into a single document. Raw data functioned as the essential unit of analysis.

The first aspect that we have evaluated was the degree of satisfaction of trained teachers towards the training offered and more precisely, the training content delivered, the access to the Learning Management System, the support provided by their trainers and the synchronous tools used. The majority of the learners were very satisfied regarding these aspects (Figure 6).

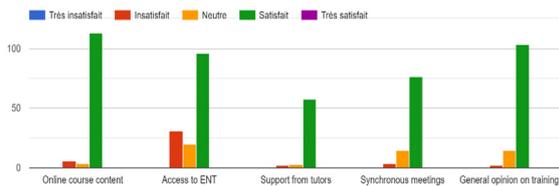


Figure 6: Satisfaction regarding Agile Training Process.

The second aspect that we have evaluated was the content of the training. We first checked whether the

intended competences were acquired by the end of the training (Figure. 8), and we then gathered the opinion of the learners concerning the learning resources delivered during the training (Figure 7).

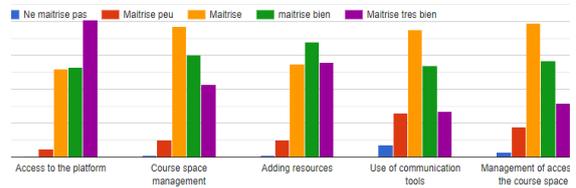


Figure 7: Acquired Competences through Training Process.

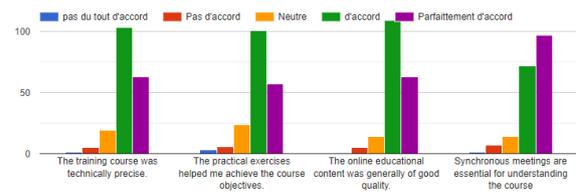


Figure 8: Satisfaction regarding the content of the ToT.

The third aspect was related to learners' satisfaction towards training methodology. Most of the learner appreciated the training methodology and way the training occurred (Figure 9).

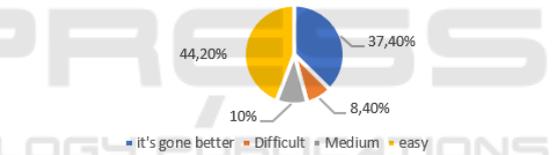


Figure 9: Satisfaction regarding the ToT methodology.

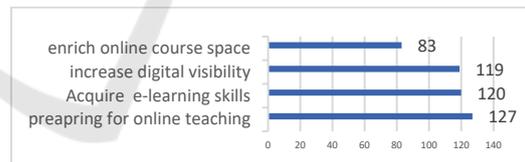


Figure 10: Learning Objectives achievement.

The fourth and last aspect that we assessed was related to the motivation of the learners towards online learning further to this ToT process. The first evaluation was in relation to the achievement of the objectives and their relevance to the training (Figure 10), and the second evaluation was regarding the motivation of the learners to be involved in eLearning projects (Figure 11).

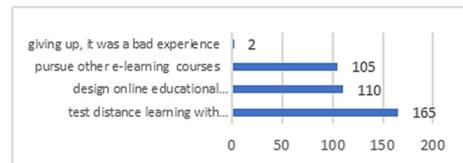


Figure 11: Motivation for e-learning.

Most learners were very motivated by the end of the training and found that they have achieved their objectives, particularly in deploying their courses.

4 RESEARCH CONTRIBUTION

The Agile Training process model is composed of 3 sprints. Each sprint is related to the Training session described through its context users, activities, training process implemented, and conducted iterations. The models were validated through questionnaires and investigated learner satisfaction with the way e-training was deployed. The survey looks for: "Quality of training content and methodology", "Competence acquisition" and "future work as online tutor". The results were very encouraging and showed that e-training objectives have been achieved. The proposed formal description of the agile process in this paper leads us to stress the importance of such a preliminary training of university teachers before the start of their online courses. Besides they were able to develop highly necessary skills of teamwork, communication, and management, to enhance e-learning culture and improve IT transfer like creation, storage and transfer of e-learning skills. We finally observe that the ToT allowed learners to improve digital skills and e-learning competence. This leads us to confirm that the agile process answer to learners' needs and adapt the training content to their field. This Agile practice may also represent an approach to establish a solution through dealing with self-organizing trainers to support the knowledge Management process that include both explicit and tacit knowledge for a better management of the training process.

5 CONCLUSION/ PERSPECTIVE

In this research work we have proposed a formal description of an agile process for training of Trainers during COVID pandemics and related to eLearning. Results observed through our pilot experience, have proven that the agile principles have greatly contributed to the adoption of e-learning by trainers ad to the achievement of the established objectives.

This experience was an opportunity to exploit online training of trainers in the pandemic's circumstance and conducted us to explore differently the potential of the online active training. Our future research will be focused on the impact of our model on the improvement of the quality of courses for

students and the asserting of learning experience. We will also explore the design of an intelligent approach for a ToT process, to be able to provide adapted agile ToT processes to various professional contexts.

We suggest further investigation of rules that describe formally the process and that would be able to automatically generate recommendations of activities to accomplish and/or tools to adopt ToT for specific teachers' profiles.

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