Co-funded by the
Erasmus+ Programme
of the European Union

Learn2Analyze (L2A)

An Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' (Instructional Designers and e-Trainers) Competences in Educational Data Analytics

Learn2Analyze

Erasmus+ Program

Knowledge Alliances (Key Action 2)

AGREEMENT NUMBER: 2017 - 2733 / 001 – 001

PROJECT NUMBER: 588067-EPP-1-2017-1-EL-EPPKA2-KA

R12b. Learn2Analyze MOOC Evaluation Plan MOOC for Pilot Phase B

Public

Disclaimer:

*The **Learn2Analyze project results** are developed with co-funding by the European Commission through the **Erasmus+ Program** of the European Union (Cooperation for innovation and the exchange of good practices - **Knowledge Alliances**, Agreement n. 2017-2733 / 001-001, Project No 588067-EPP-1-2017-1-EL-EPPKA2-KA). The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflects the views only of the authors, and the Commission will not be held responsible for any use which may be made of the information contained therein.*

Learn2Analyse Consortium

Contact

Professor Demetrios Sampson, Learn2Analyse Project Co-ordinator
Department of Digital Systems, University of Piraeus,
80, Karaoli and Dimitriou Street, Piraeus, 18534 / Greece
Phone: +30-210-4142766
E-mail: sampson@unipi.gr

Executive Summary

The scope of **Result 12b** (*Learn2Analyze MOOC Evaluation Plan for Pilot Phase B*) is to define the evaluation plan of the Learn2Analyze MOOC version 2 (as it is developed in Results 5b, 6b, 7b) and its pilot run in phase B (March-June 2021). It describes the goals of the evaluation, the implementation actions, the instruments to be used and the data to be collected. The focus of the Learn2Analyze MOOC Version 2 Evaluation plan (Result #12b) is to investigate whether the revision of the design and development of the Learn2Analyze MOOC, based on the insights obtained from the pilot phase A described in R13 (Evaluation and Recommendations Report), improved Learning Experiences and Outcomes.

The core goals of the phase B evaluation are:

- to create the L2A MOOC Phase B participants' profile both in terms of general demographics as well as professional identity and educational data literacy competence background.
- To create the L2A MOOC Phase B participants' gamification profile in terms of previous gamification experience, attitude towards gamification and gamification user type.
- to evaluate the participants' learning experiences from the L2A MOOC in relation to content, activities, workload, support, platform in relation to the reported learning experiences from the L2A MOOC Phase A.
- To evaluate the participants' gamification experiences from the L2A MOOC along with the effectiveness of gamification integration
- to evaluate participants' achieved learning outcomes in relation to their entry level educational data literacy competence background.

Table of contents

1. Introduction & Scope

This document defines the evaluation plan of the Learn2Analyze MOOC version 2 (as it is developed in Results 5b, 6b, 7b) and its pilot run in phase B (March-June 2021). It describes the goals of the evaluation, the implementation actions, the instruments to be used and the data to be collected.

The scope of the Learn2Analyze MOOC Version 2 Evaluation plan (Result #12b) is to investigate whether the revision of the design and development of the Learn2Analyze MOOC, based on the insights obtained from the pilot phase A described in R13 Evaluation and Recommendations Report, improved Learning Experiences and Outcomes.

The core goals of the evaluation are:

- to create the L2A MOOC Phase B participants' profile both in terms of general demographics as well as professional identity and educational data literacy competence background.
- To create the L2A MOOC Phase B participants' gamification profile in terms of previous gamification experience, attitude towards gamification and gamification user type.
- to evaluate the participants' learning experiences from the L2A MOOC in relation to content, activities, workload, support, platform in relation to the reported learning experiences from the L2A MOOC Phase A.
- To evaluate the participants' gamification experiences from the L2A MOOC along with the effectiveness of gamification integration
- to evaluate participants' achieved learning outcomes in relation to their entry level educational data literacy competence background.

Next, we present the core objective, the instruments for data collection and the method of data analysis for each goal.

2. Background & Environment Scan Review

Massive Open Online Courses (MOOCs) are currently a core trend in online education and training (Liyanagunawardena, Adams, & Williams, 2013). Commonly identified issues with the effectiveness of MOOCs are course completion, participation, motivation and retention issues (Egloffstein, Ebner, & Ifenthaler, 2019). The continuous improvement of the quality of MOOCs so that the MOOC participants can get the best possible learning outcomes still remains an open issue. To this end, several good practices for the evaluation of MOOCs have been documented in the literature (Alturkistani, Majeed, Car, & Brindley, 2018).

In this section, we provide a brief environment scan review with regard to the evaluation of MOOCs, divided into four areas, according to the anticipated goals of our evaluation plan, namely:

(i) MOOC participants' profile capturing,

(ii) evaluation of participants' learning experiences in MOOCs,

(iii) evaluation of participants achieved learning outcomes in MOOCs, and

(iv) evaluation of gamification

using questionnaire-based surveys and system data.

2.1 MOOC participants' profile capturing

Our first goal focuses on methods for collecting information for the MOOC participants, towards creating the MOOC learners' profile. We aim at exploring and better understanding the MOOC participants' cohort, so as to better understand their experiences with the MOOC. In relation to their performance, the findings can help us identify and interpret patterns and potential issues, such as the underperformance of different subgroups of students with different characteristics (Hennis, Topolovec, Poquet, Vries, 2016).

To this end, we are interested in collecting data on demographic characteristics, motives, and background knowledge on the subject matter, using questionnaire-based surveys (registration and pre-course survey). The data[1] will be analyzed to provide insights into "***who the learners are***" and "***why they enroll in the course***" and it will be correlated with learning experience data and achieved learning outcomes collected through a post-course survey. Our target is to leverage the outcomes for improving the educational design of the MOOC and thus to better meet the learning needs of our MOOC participants in future editions.

The collection and analysis of MOOC participants' characteristics is addressed in the majority of research literature on MOOCs (Bayeck, 2016; Kizilcec, Piech, & Schneider, 2013), mainly targeting to improve the design of the MOOCs and hence their quality. Veletsianos and Shepherdson (2016) identify MOOC learners' demographics, perceptions, preferences and motivation as some of the topics that prevailed across systematic analysis of the empirical MOOC literature published in 2013-2015. As further emphasized, researchers have favored a quantitative approach to MOOC research, preferring the collection of data via surveys and automated methods (Veletsianos & Shepherdson 2016). The collection of learners' self-report features through questionnaire-based surveys, upon enrolling in the MOOC, is also highly recommended in the "*Practical guide for MOOC tutoring and design*"

[1] Personal data will be treated as per GDPR.

(Castrillo, Martin-Monje, Vázquez-Cano, 2018). In order to capture the profile of the participants, a set of common variables/items are considered/included in most surveys, such as sociodemographic characteristics (gender, age, geographical location, employment status), academic and professional background, previous experience with MOOCs, motivations and expectations (Gil-Jaurena, Callejo-Gallego, & Agudo, 2017). Most MOOC providers use these findings to understand their learners (Ho et al., 2015) since MOOCs are openly accessible by a wide variety of enrolled participants with diverse demographics, motivations, and backgrounds.

Although there are some studies claiming that MOOCs' participants represent a quite homogeneous population (Shrader, Wu, Owens, & Ana, 2016), the common understanding is that MOOCs are appealing for a diverse mix of participants in terms of cultural and educational background, country of origin, employment status, motivations and learning experiences (Bayeck, 2016; Dillahunt, Chen, & Teasley, 2014; Guo & Reinecke 2014; Hennis, Skrypnyk, De Vries, 2015; Woodgate, Macleod, Scott, & Haywood, 2015).

As per Christensen et al., (2013) "*the student population tends to be young, well educated, and employed, with a majority from developed countries*." On the other hand, Ho et al., (2015) emphasizes that the "*characterization of MOOC participants as a group of college-educated men in their late 20s misrepresents substantial variation, especially across different kinds of courses*". With regards to gender literature reports that there is a predominance of male learners in MOOCs (Hennis, Topolovec, Poquet, Vries, 2016), although in the last years there is an increase in female participation (Ho et al., 2015). When it comes to age, as reported by Hennis, Topolovec, Poquet, and Vries (2016), younger students seem more oriented towards receiving a certificate while older students are more work-motivated, keen to acquire new competences which are certified, thus leading them in better performance.

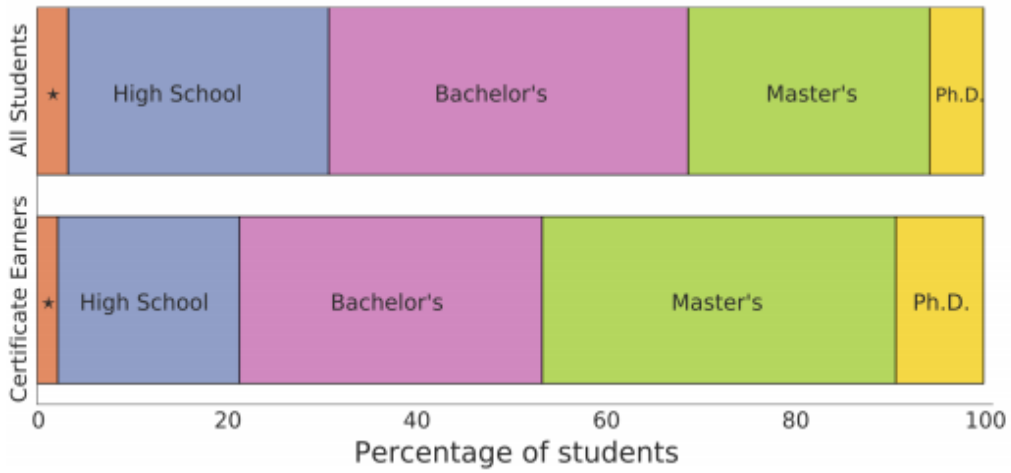


Figure 1. MOOC students' education levels (Guo & Reinecke, 2014)

Guo and Reinecke (2014) performed data analysis on the activities of 140,546 students in four edX MOOCs. **Figure 1** shows the distributions of self-reported education levels (top) for all students and certificate earners (bottom) in all four courses; (*) represents an elementary or junior high school graduate. As depicted, certificate earners tend to have more years of education than the general student population.

Research studies show that the combination of learners' profiles with behavior within the MOOC can reveal engagement patterns and possibly predict performance. Demographic factors are considered to influence performance (Tempelaar, Rienties, & Giesbers, 2015) and have been used to address multiple research issues ranging from fundamental questions on socioeconomic status and MOOC enrollment (Hansen & Reich, 2015) to differences in how MOOC participants navigate through MOOCs (Guo & Reinecke, 2014). As emphasized by Hood and Littlejohn (2016), "*successful learning in MOOCs is learner driven and learner determined*".

With regards to motives, studies report a much wider range of MOOC participants' motivations for learning compared to conventional courses (Hood & Littlejohn, 2016). According to Hood and Littlejohn (2016) "*motivation determines how a person engages with a learning opportunity both cognitively and behaviorally, and therefore, is a mediating factor in relation to other quality measures*." Many research studies and surveys reflect the diversity of possible intentions of MOOC participants beyond earning a certificate of completion (Hood & Littlejohn, 2016; Shrader, Wu, Owens, & Ana, 2016). These MOOC populations tend to redefine the MOOC experience to fit their needs (Shrader, Wu, Owens, & Ana, 2016). Koller, Ng, Do, and Chen (2013) also consider that retention metrics in MOOCs must be defined and interpreted in accordance to the learner's goals. In Egloffstein and Schwerer (2019), initial learning objectives and actual achievement are systematically compared for a large sample of participants in enterprise MOOCs.

To measure MOOC learner motivation, there are several scales incorporated mainly in pre-course questionnaire based-surveys (Wang & Baker, 2018). The 8-item short Grit Scale, which measures the "*perseverance and passion for long-term goals*" (Duckworth & Quinn, 2009), has been used to assess learners' consistency of interests and perseverance of efforts (Wang & Baker, 2018). As per Wang and Baker (2018) findings, the grit scale "*can predict course completion independently from intention to complete and with comparable strength*". The 8-item short Grit Scale is used by many MOOC providers like www.edX.org for example in the course "PennX: BDE1x "Big Data and Education".

PALS (Patterns of Adaptive Learning Survey) scale is also a well-known and widely used survey measure of goals (Anderman, Urdan, & Roeser, 2005). The Motivated Strategies for Learning Questionnaire (MSLQ) has proven to be a reliable and useful self-report instrument

(Duncan & Mckeachie, 2010). The MSLQ when adapted for MOOC learners usually consists of 18 MSLQ motivation assertions and 12 MSLQ assertions about usual learning strategies (Alario-Hoyos, Estévez-Ayres, Pérez-Sanagustín, & Delgado-Kloos, 2017). The motivation assertions are grouped in three categories: IGO (Intrinsic Goal Orientation), TV (Task Value), and SELP (Self-Efficacy for Learning and Performance) and they are used to identify their motivation to participate in the MOOC and their preferences on materials and assignments. Assertions about usual learning strategies which give hints about learners' strengths and weaknesses when facing MOOCs regarding organizational aspects are grouped into two categories: CT (Critical Thinking) and TSE (Time and Study Environment) (Alario-Hoyos et al., 2017). For our L2A MOOC participants' profile capturing, we decided to incorporate the Grit scale in our pre-course questionnaire as described in Section 3 and Appendix A3.

2.2 Evaluation of participants' learning experiences in MOOCs

The evaluation of the participants' learning experiences in a MOOC is a very wide topic and there are several different perspectives documented in the literature. There is a rich body of literature for the indicators for evaluating learners' experience in Online Courses in general. For example, Ulf-Daniel Ehlers (2004) describes a learner-focused quality concept that consists of thirty dimensions including interaction, information transparency (i.e. clearly stated learning goals), communication, course structure, multimedia, background material, support of learning, feedback.

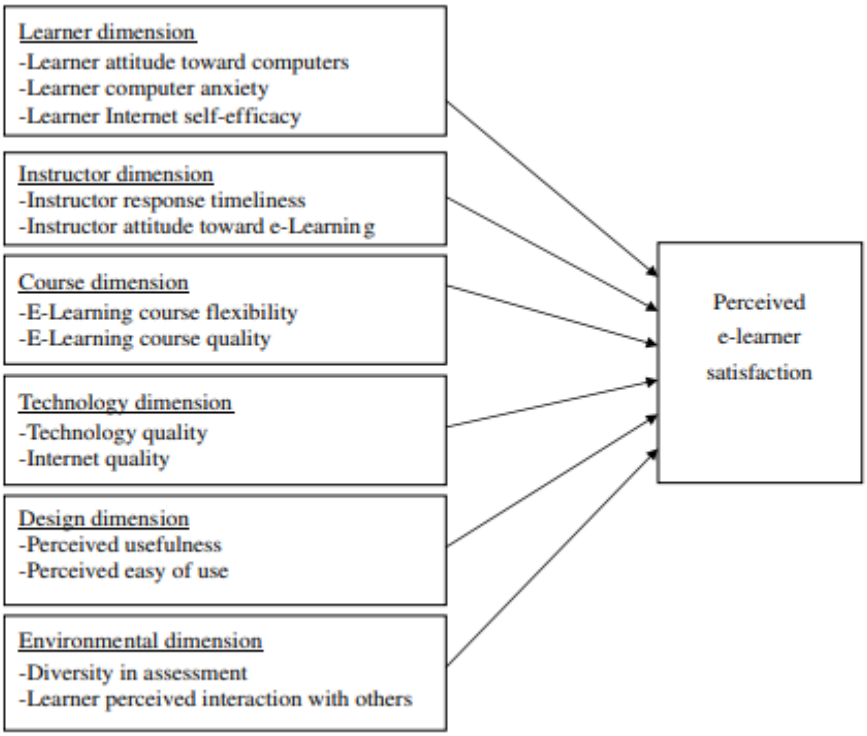


Figure 2. Six dimensions of e-Learning from learners' perspective (Sun et al., 2008)

Sun et al. (2008) have condensed six dimensions of e-Learning from learners' perspective that would result in learner's satisfaction (**Figure 2**). These dimensions are: learners, instructors, courses, technology, design, and environment. Jung (2011) recognizes seven dimensions in evaluating the e-learning quality: Interaction, Staff Support, Institutional Quality Assurance Mechanism, Institutional Credibility, Learner Support, Information and Publicity and Learning Tasks.

However, it is questionable if those indicators are suitable for MOOCs, due to the unique features of those online courses (Gamage, Fernando & Perera, 2015). Perris (2015) evaluated the "MOOC on MOOCs" using six dimensions in the online post-course survey, including content, assessment activities, interaction (between participants or between participants and instructor), instructional design (method of course delivery), connectivity (Internet access to course) and course platform. Rienties and Toetenel (2016) reported that the number of assignments, the duration of the course, and the workload had a strong and significant impact on overall learners' satisfaction: learners who were more satisfied with the quality of teaching materials, assessment strategies and workload were more satisfied with the overall learning experience. Furthermore, long-term goals of learners (i.e., qualifications and relevance of modules with learners' professional careers) were important predictors for learner satisfaction, in particular at post-graduate level. Gil-Jaurena et al. (2017) examined 17 MOOCs offered in the Spanish National University of Distance Education (UNED) and collected information from a sample of more than 24,000 learners (initial survey) and 2,003 learners (final survey). In their work the dimensions regarding the learning experience include: reasons for enrolling, course expectations, overall level of satisfaction, satisfaction with the platform, satisfaction with the length of the course, satisfaction with the content (videos, complementary material, tests, self-assessments, activities of peers), support from the facilitator, support from peers, future expectations. Egloffstein at al. (2019) have conducted a multi-perspective evaluation of Mannheim Business School's initial MOOC (MBSx:VBM). The learner-oriented evaluation focused on contextual and motivational variables. Participant characteristics along with the learners' initial motives were examined in the pre-course survey, while learners' perceptions of the course design and the instructional elements were examined in the post-course survey.

Along with the research literature, best practices regarding MOOC evaluation were examined. There are several MOOC platforms offering online courses. Thus, we have studied the survey instruments used for the registration, the pre-course and the post-course survey, in the most widespread and prevalent platforms, in terms of the number of courses and enrolments. To this end*, PennX: BDE1x "Big Data and Education"* and *MichiganX: PLAx "Practical Learning Analytics"* from http://www.edx.org/ were used to form the learners' satisfaction questionnaire to measure the learning experience through the L2A MOOC.

Furthermore, the manual for post-evaluation from Ellen Taylor-Powell and Marcus Renner (2009) was also taken into consideration. The manual is organized according to five types of information that can be gained at the end of an educational event: participant reactions, teaching and facilitation, outcomes, future programming, participant background.

Based on the above best practices' environment scan, we decided to focus the evaluation of participants' learning experience in the L2A MOOC on the content, the learning activities and the workload per module, as well as, on the overall learning experience concerning the difficulty level, the workload spread, and the platform usability. Along with the evaluation of the learning experience, the participants will answer questions concerning the overall perceived satisfaction from the MOOC.

2.3 Evaluate participants' achieved learning outcomes in MOOCs

Typically, registration in MOOCs is free and, in the majority of cases, without any pre-requisite qualifications or knowledge. The reasons that one chooses to attend a MOOC may be his interest in the specific subject, the desire to acquire new knowledge or update his or her previous professional development, as discussed in section 2.1. As a result, dropout rates in MOOCs are much higher than those of the traditional courses. Many of those initially enrolled in a MOOC do not intent to complete the MOOC, so counting them on the dropout rate can be misleading (Hone & El Said, 2016; Egloffstein & Schwerer, 2019). Studies report that less than 7% of the enrolled participants in a MOOC will complete it with a certificate (Jordan, 2014). As Khalil and Ebner (2014) argue, numerous studies deal with how to avoid high attrition rates and why students drop out or fail. Daradoumis et al. (2013) emphasize that measuring the quality of a MOOC only from the dropout rates might not represent the reality and suggests analyzing further each participant's objectives to evaluate the MOOC's effectiveness. Christian Stracke (2017) proposes the completion of individual goals and intentions by the MOOC learner as a more appropriate quality indicator for evaluating the quality of MOOCs than the traditional drop-out rates. Egloffstein and Schwerer (2019) compare participants' intended learning objectives and actual achievements in Enterprise MOOCs at openSAP to extract more reliable and realistic performance indicators. Wilkowski, Deutsch, and Russell (2014), identified prior experience of participants who registered for the "Mapping with Google" MOOC, using pre-course survey and measured students' self-reported goal achievement on a post-course survey.

In order to measure potential success in L2A MOOC, instead of concentrating only to simple data such as ***certification*** and ***dropouts***, we will also consider self-assessment reporting by the L2A MOOC participants on whether the course contributed to the ***advancement of their***

educational data literacy competence level as self-perceived. Thus, the starting competence level for every statement of the L2A Educational Data Literacy Competence Profile will be measured using a pre-course questionnaire. After the L2A MOOC completion, participants will be asked to self-assess their learning accomplishment evaluating their current competence level as an indicator of the achieved progress. The levels we used, so that the participants can self-assess their competence, are based on the Dreyfus model of skill acquisition (Dreyfus, 2004), which is widely implemented "*to provide a means of assessing and supporting progress in the development of skills or competencies*" (Lester, 2005).

2.4 Evaluation of gamification

Evaluating gamification outcomes

During the last decade, gamification has gained significant attention and been presented as a successful strategy to engage users, with potential for online education (Antonaci et al., 2019). The gamification literature review shows that education and learning are the most common contexts for empirical research (Koivisto & Hamari, 2014, 2019; Majuri et al., 2018). To examine the effects and benefits that the implementation of the gamification offers, Hamari, Koivisto and Sarsa (2014) created a framework to conceptualize gamification, which consists of three main parts: the implemented motivational affordances, the resulting psychological outcomes, and the further behavioral outcomes (**Figure 3**).

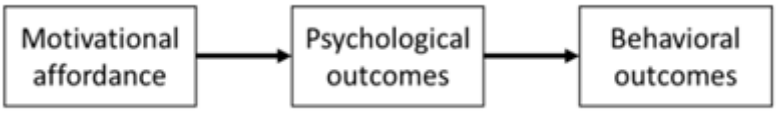


Figure 3. Conceptualization of the gamification (Hamari et al., 2014)

The affordances refer to the various elements and mechanics that structure games, aid in inducing gameful experiences within a system or service leading to the psychological outcomes, which refer to game psychological experiences as competence, autonomy, relatedness or enjoyment, while they lead further to behavioral outcomes, i.e. behaviors and activities that are supported through use of gamification system such as better learning results in the context of education (Koivisto & Hamari, 2019). Affordances are considered as independent variables/items, psychological outcomes both dependent and independent variables/items and behavioral outcomes only as dependent variables/items.

To research gamification in depth, Koivisto and Hamari (2019) conducted a comprehensive review of 819 studies and presented a list of outcomes studied in the 273 empirical studies

that had been found. Psychological outcomes were studied in 138 studies with most common of which being perception of use (use experience, perceptions of system and features), enjoyment, motivation, perceived usefulness and ease of use, followed by challenge, interest, perceived competence and satisfaction (Koivisto & Hamari, 2019). Behavioral outcomes seem to be more frequently studied (studied in 166 of the 273 empirical studies), but lack of variety with participation (in the system/system use) and performance (in aspects of time, amount of contributions, grades/academic performance, amount of points/badges and learning/skill progression) being most common (Koivisto & Hamari, 2019). While the general gamification literature review of Koivisto and Hamari (2019) had not been still published, Majuri, Koivisto and Hamari (2018) reviewed gamification on education literature with similar findings and emphasis on grades and speed of conducting tasks and assignment, which is referred as logical as such outcomes are often the quantifiable goals of education. Additionally, Antonaci et al. (2019) identify six areas of gamification empirical effects in online learning environments: performance, motivation, engagement, attitude towards gamification, collaboration, and social awareness.

Research studied present positive or mostly positive effects from the implementation of the gamification. However, a gap still remains to the effects control of the individual affordances used in a given gamification implementation (Dichev & Dicheva, 2017; Hamari et al., 2014; Koivisto & Hamari, 2019; Majuri et al., 2018). Without understanding the effect of each element separately, it is difficult to identify their contribution in studies with a group of gamified elements (Dichev & Dicheva, 2017).

Regarding the data type and the gathering methods, the review of the literature shows almost equally survey and use/log data to be most common. As for data gathering methods, the most commonly used seems to be survey/questionnaire, either qualitive or quantitative, along with the gamified system implementation/prototype (Hamari et al., 2014; Koivisto & Hamari, 2019). A popular structure for data gathering seems to be the combination of the two categories (Koivisto & Hamari, 2019).

For the evaluation of gamification value to course content, Youssef (2015) recognize six (6) critical issues to be considered: course goals, culture of learning community, type of content, level of learning trying to be achieved based on Bloom's Taxonomy, technical/structural environment and capacity of the Institution, budget. Tondello et al. (2016) reviewed several gameful design frameworks and presented a set of guidelines for heuristic evaluation of gameful design with three (3) categories and twelve (12) dimensions (**Table 1**).

Table 1: Heuristic Evaluation for Gameful Design (Tondello et al., 2016).

Intrinsic Motivation Heuristics	Extrinsic Motivation Heuristics	Context Dependent Heuristics
Purpose and Meaning	Ownership and Rewards	Feedback
Challenge and Competence	Scarcity	Unpredictability
Completeness and Mastery	Loss Avoidance	Change and Disruption
Autonomy and Creativity		
Relatedness		

To provide a more concise view of gamification factors, Baptista and Oliveira (2019) conducted a meta-analysis of 54 studies and 59 datasets about gamification and serious games and developed a theoretical model for the most significant relationships between the recorded effects (**Figure 4**).

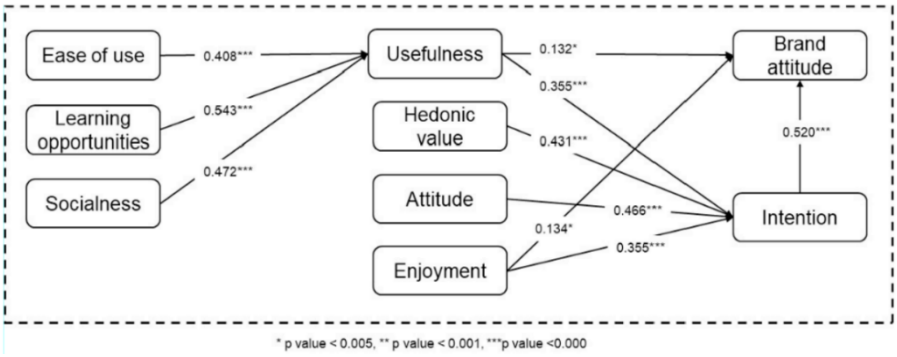


Figure 4: Theoretical model based on the results of the weight and meta-analysis (Baptista & Oliveira, 2019)

Romero-Rodriguez et al. (2019) evaluated gamification strategies used in MOOCs that had been analyzed by applying the Integrated Theoretical Gamification Model in E-Learning Environments (E-MIGA) (Torres-Toukoumidis et al., 2018) which taxonomy consists of four (4) dimensions and nineteen (19) indicators (**Figure 5**).

Dimension	Indicators
Typology of actors *(TA)*	- *CSB:* Characteristics of the student body (target). - *SR*: Student roles. - *TR*: Teacher roles. - *OA:* Other actors in the process.
Motivation for learning *(ML)*	- *ACM:* Access to concepts and materials. - *LS:* Learning schedule. - *CTE:* Completing tasks and exercises. - *GID:* Gradual increase in the degree of difficulty of the lessons. - *TA:* Measuring time to complete the activity. - *IS:* Interaction systems. - *LBE:* Learning based on pragmatic experiences and exemplifications.
Creating and maintaining expectations *(CE)*	- *SDC:* Type of stimulation of didactic components. - *GE:* Gameplay elements: levels, challenges, goals, etc. - *PBL:* Reward systems: points, badges, and leaderboards. - *FI:* Feedback on interactions. - *NS:* Narrative and storytelling. - *PC:* Promoting competition and cooperation.
User Control *(UC)*	- *AMA:* Ability of the main actor (user) to determine the course of the story. - *P:* Personalization.

Figure 5. Taxonomy of E-MIGA (Romero-Rodriguez et al., 2019)

To give a clearer and more measurable frame to gamefulness, Högberg et al. (2019) developed and validated the GAMEFULQUEST (Gameful Experience Questionnaire), which measures the gameful experience users have while using a gamified system or service. Based on questionnaires that have been used in literature to measure the game experience or its dimension, Högberg et al. (2019) derived seven (7) main dimensions: accomplishment, challenge, competition, guided, immersion, playfulness, and social experience.

Karra et al. (2019) propose a gamification design framework for adult trainees motivation based on the combination of gamified elements and strategies with the three components of Self-Determination Theory SDT (autonomy, competence, relatedness), as literature reports a direct link between gamification and SDT leading to intrinsic motivation.

Gamification outcomes' factors

Reviewing past literature on the evaluation of the gamification, few studies are observed to analyze users' profile and how their individual differences can be factors that influence psychological, behavioral, and learning outcomes.

In the early researches in online learning, Lim and Kim (2003) examined sociodemographic and motivational factors to reveal that gender, profession and motives affect their learning

outcomes. More recently, Koivisto and Hamari (2014) studied the demographic differences in perceived benefits from gamification and examined the effects of users' gender, age and time using the gamified system on their behavior and attitude towards it. The findings show that "women report greater social benefits from the use of gamification and ease of use of gamification is shown to decline with age". Gender being a factor to the participants' outcomes with regards to gamification is also confirmed by Tsay et al. (2018). The empirical study of the evaluation of the use of gamification to the course and the gamified supported material indicated that female participation was significantly higher than male. Job seems also to affect the outcomes as it was reported that students with jobs engaged significantly more than unemployed ones.

Previous experience with gamification and gamified systems appears to be a factor to the participants' outcomes. Some authors discuss the novelty effects that might occur with gamification (Farzan et al., 2008; Hamari, 2013, 2017; Hamari et al., 2014; Koivisto & Hamari, 2014). In some cases, studies have shown a diminution of perceived enjoyment, usefulness, and playfulness of users as they spent more time using gamified services. In the begging, users seem to feel more excited using the gamification elements, but it fades as their curiosity is being satisfied. Koivisto and Hamari (2014) note that "the interaction effects between age and time using the service show that the novelty effects are stronger the younger the user is", leading to the general belief that younger people are more open to gamified courses but get bored quickly, while the older ones might experience the opposite situation.

While most of the literature review shows that the integration of the gamification elements on the information systems, especially on education and online learning, has mainly positive effects and benefits, a few studies have shown that some of the gamification elements, such as leaderboard and other competition mechanics, affect negatively learners' psychological outcomes and do not improve their educational performance (Hanus & Fox, 2015). This kind of findings confirms the common thought that every user experiences the same motivational affordance with different effect.

In the discussion for the psychological aspects that might affect the outcomes of the gamification, Hamari (2017) suggests the study of the personality and player types as moderators. One of the most common model for the identification of user's personality type is the Big 5 model (McCrae & John, 1992). The five (5) dimensions of personality traits operate more like spectrums rather than binary categories: extraversion (how much outgoing or solitary a person is), agreeableness (how much compassionate or detached a person is), conscientiousness (how much organized or not a person is), neuroticism (how much confident or nervous a person feels), and openness to experience (how much open or closed to experiences a person is).

(E)	Extroversion	**Energy**	Introversion	(I)
(S)	Sensing	**Perception**	Intuitive	(N)
(T)	Thinking	**Judgment**	Feeling	(F)
(J)	Judging	**Orientation**	Perceiving	(P)

Figure 6. The four dimensions of MBTI and their poles (Butler, 2014)

Based on the difficulty to design framework for appropriate outcome's behavior, Butler (2014) presents a framework to evaluate the effectiveness of the gamification affordances by users' personality type, categorizing them with the Myers-Briggs Type Indicator (MBTI) (Myers & McCaulley, 1985; Myers, 1962) (**Figure 6**).

Tondello et al. (2016) created and validated the Gamification User Types Hexad Scale, a 24-items survey response scale based on Marczewski's (2015) Gamification User Types Hexad framework, to fill the gap of assessment protocol for users' preferences and map their personality onto design elements of gamified systems. Hexad framework was developed based on human motivation, player types, and practical design experience (G. F. Tondello et al., 2016) and consists of six (6) types (Marczewski, 2015):

- Philanthropists (motivated by purpose)
- Socialisers (motivated by relatedness)
- Free Spirits (motivated by autonomy)
- Achievers (motivated by competence)
- Players (motivated by extrinsic rewards)
- Disruptors (motivated by the triggering of change)

Hexad scale combines personality characteristics with player types creating an interesting factor for psychological and behavioral outcomes that occur from the motivational affordances.

On the other hand, to understand the factors for a successful MOOC, Aparacio et al. (2019) propose a theoretical framework based on gamification and information system (IS) theory. Although gamification was reported to play a crucial role to the success of MOOC (M. Aparicio et al., 2019), it is suggested to also take into account the contextual characteristics as they are likely to affect the results (Dichev & Dicheva, 2017; Hamari et al., 2014; Koivisto & Hamari, 2019; Majuri et al., 2018).

Evaluating gamified MOOCs' overall success

Even though the popularity of MOOCs has been increased during the last decade, high dropout rates continue to be the most common negative characteristic. Although the

integration of gamification elements and strategies on MOOCs manages to reduce the participants' dropout, the completion rates remain low. Among the reasons for students' dropout (e.g., lack of time, skills or support, course difficulty or poor quality, technical issues) is that they might never intended to complete the course. In the Attrition Model for Open Learning Environment Setting (AMOES) (Rizzardini et al., 2016), one of the three learners' groups that are defined is the healthy attrition group, in which none of the learners intends to complete the course, and includes exploring users (only previewing the course to gain a quick understanding of the topic), content learners (choosing only what they wish to learn from the course) and restricted learners (checking out the entire course but not intending to complete assignments or earning badges and certificates) (Rizzardini et al., 2016). With MOOCs not necessarily need to be completed to considered successful, Antonaci et al. (2017) introduce the Personal Goal Achievement Ratio (PGAR) and the Overall Goal Achievement Ratio (OGAR). PGAR is calculated as the personal completion rate (PCR) divided by the self-reported user intention ratio (UIR) (Antonaci et al., 2017):

$$Personal\ Goal\ Achievement\ Rate(PGAR) = \frac{PCR}{UIR}$$

As a result, the OGAR is calculated through the following formula (Antonaci et al., 2017):

$$Overall\ Goal\ Achievement\ Rate\ (OGAR) = \frac{1}{n} * \sum PGAR$$

Undoubtedly, learning outcomes achieved by users represent a significant indicator for MOOC's success. In the evaluation framework for MOOCs4PD, Sofia Mougiakou (2020) suggests perceived advancement of competence level to measure the learning outcomes. The competence level advancement results by the difference between the achieved and initial competence level, which are self-reported respectively in a post- and pre-course survey (Mougiakou, 2020):

$$Competence\ Level\ Advancement$$
$$= Initial\ Competence\ Level - Achieved\ Competence\ Level$$

3. Overview of the L2A MOOC Version 2 Course Design and Implementation

The Learn2Analyze MOOC version 2 aims to support the development of both core and advanced competences for Educational Data Analytics of Online and Blended teaching and learning. The learning outcomes of this MOOC cover the set of competences described by the Learn2Analyze Educational Data Literacy competence framework, available at www.learn2analyze.eu.

The new version incorporates:

- gamification elements to offer enhanced engagement in several authentic learning activities;
- self-assessed assignments based on real-life scenarios to offer deeper understanding of the educational data field; and
- an upgraded assessment mechanism leading to two levels of Certification of Achievement on Educational Data Literacy (EDL). Level A requires the learner to have acquired a basic set of competences for EDL and Level B requires demonstration of a higher expertise assessed through hands-on assignments based on simulated practice scenarios.

The primary targeted groups of the Learn2Analyze MOOC are:

- e-Learning Professionals, in particular Instructional Designers, Instructors / Tutors and Managers of online and blended learning courses,
- Higher Education Students,
- University and School Teachers interested to further develop their Educational Data Literacy, as well as
- Academics, Researchers and Professionals involved in Educational Data Literacy and Educational Data Analytics.

Following the xMOOC-model, the Learn2Analyze MOOC content is organised into six self-contained modules: Educational Data, Learning Analytics, Teaching Analytics, Educational Data Analytics with Moodle, Educational Data Analytics with eXact Suite, Educational Data Analytics with IMC Learning Suite, plus an Orientation and a Concluding module.

The anticipated course duration for the L2A MOOC Phase B is nine (9) weeks and consists of eight (8) modules including six (6) core modules, one orientation and one concluding module. The expected effort to complete the basic requirements for the Certificate of Achievement is approximately one hundred (100) hours in total. The Learn2Analyze MOOC promotes self-directed learning with video pages, HTML (Text & Graphics) pages and activities (polls, forums). The individual learning progress will be monitored with

- learning activities implemented after each content subtopic, where learners are requested to undertake complex tasks and answer MCQs
- concluding self-assessed assignments for each module using rubrics for the assessment

Participants have the opportunity to earn two free-of-charge certificates upon successful completion of the entire MOOC: Level A Certificate and Level B Certificate of Achievement on Educational Data Literacy.

- L2A Certificate of Achievement Level A requires developing a basic set of competences for EDL. In order to gain the Certificate of Achievement Level A learners must gain a mark of 60% or greater overall to the corresponding set of level A 100 multiple choice quiz questions, aiming to assess their understanding of the core concepts presented in the 6 core modules.
- L2A Certificate of Achievement Level B requires demonstration of a higher expertise assessed through hands-on assignments based on simulated practice scenarios. More specifically, for the Certificate of Achievement Level B, there is a final concluding assessment, where learners are requested to undertake complex tasks, by going through several steps (e.g. by following a use case) and answer a set of 100 Multiple-Choice Questions (MCQs) which are automatic graded by the platform. In order to gain the Certificate of Achievement Level B learners must gain a mark of 60% or greater overall to the corresponding set of 100 level B multiple choice quiz questions.

Both sets of Multiple Choice Questions are included at the end of the course.

4. Evaluation Plan Design

4.1 Objectives

In order to carry out a comprehensive evaluation of the L2A MOOC (version 2), the following guiding questions have been identified:

- What is the demographic profile and educational/professional background of the participants in the Learn2Analyze MOOC Phase B?
- What is the gamification profile of MOOC's participants and what are the main characteristics of player types?
- What are the motivations and expectations of the participants undertaking the Learn2Analyze MOOC Phase B and to which level are they met?
- What is the participants' background competence in Educational Data Literacy per EDL-CP statement?
- What are the participants' learning experiences with regard to course design, content, course activities, assessment, interaction with other participants and/or instructor, platform usability and workload?
- Were participants able to improve their Educational Data Literacy competences, and to what extent?
- What is the difference in psychological and behavioral outcomes per gamification profile?
- What is the overall gamification experience of participants in the MOOC and how is it related to personal goal achievement and competence advancement?

- What is the gamification experience per element and how does it affect the overall gamification experience?
- What is the overall goal achievement rate for the gamified MOOC?

To answer to these questions, the goals of the evaluation plan for the Learn2Analyze MOOC have been established as follows:

- to create the L2A MOOC participants' profile both in terms of general demographics as well as professional identity and educational data literacy competence background.
- To create the L2A MOOC Phase B participants' gamification profile in terms of previous gamification experience, attitude towards gamification and gamification user type
- to evaluate the participants' learning experiences from the L2A MOOC Phase B with respect to content, activities, workload, support, platform.
- to evaluate participants' achieved learning outcomes in relation to their entry level educational data literacy competence background.
- To evaluate the participants' gamification experiences from the L2A MOOC along with the effectiveness of gamification integration

The evaluation of the second version of Learn2Analyze MOOC adheres the framework that was used to evaluate the first edition (Result #12).

Figure 7 shows the elements of pre- and post-course survey that constitute the evaluation framework applied to Learn2Analyze MOOC Phase A.

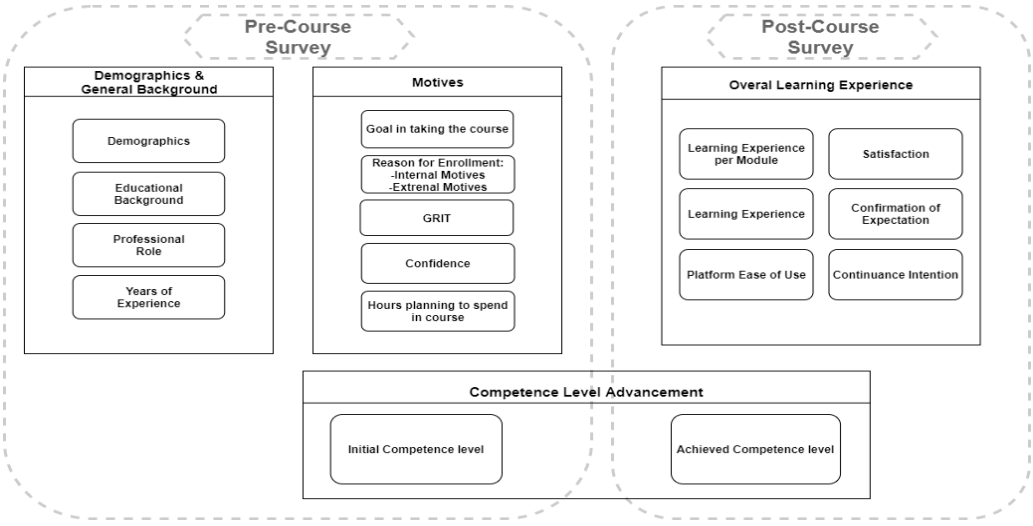


Figure 7: Pre- and Post-course survey elements of L2A MOOC Phase A

Due to the integration of gamification elements in the new version, a gap arises in the evaluation of the course. In order to evaluate this new feature and its outcomes, the

proposed evaluation framework for the Gamification of gamified MOOCs4PD is incorporated in the prior one.

Figure 8 shows the elements of pre- and post-course survey and system data that constitute the evaluation framework applied to Learn2Analyze MOOC Phase B

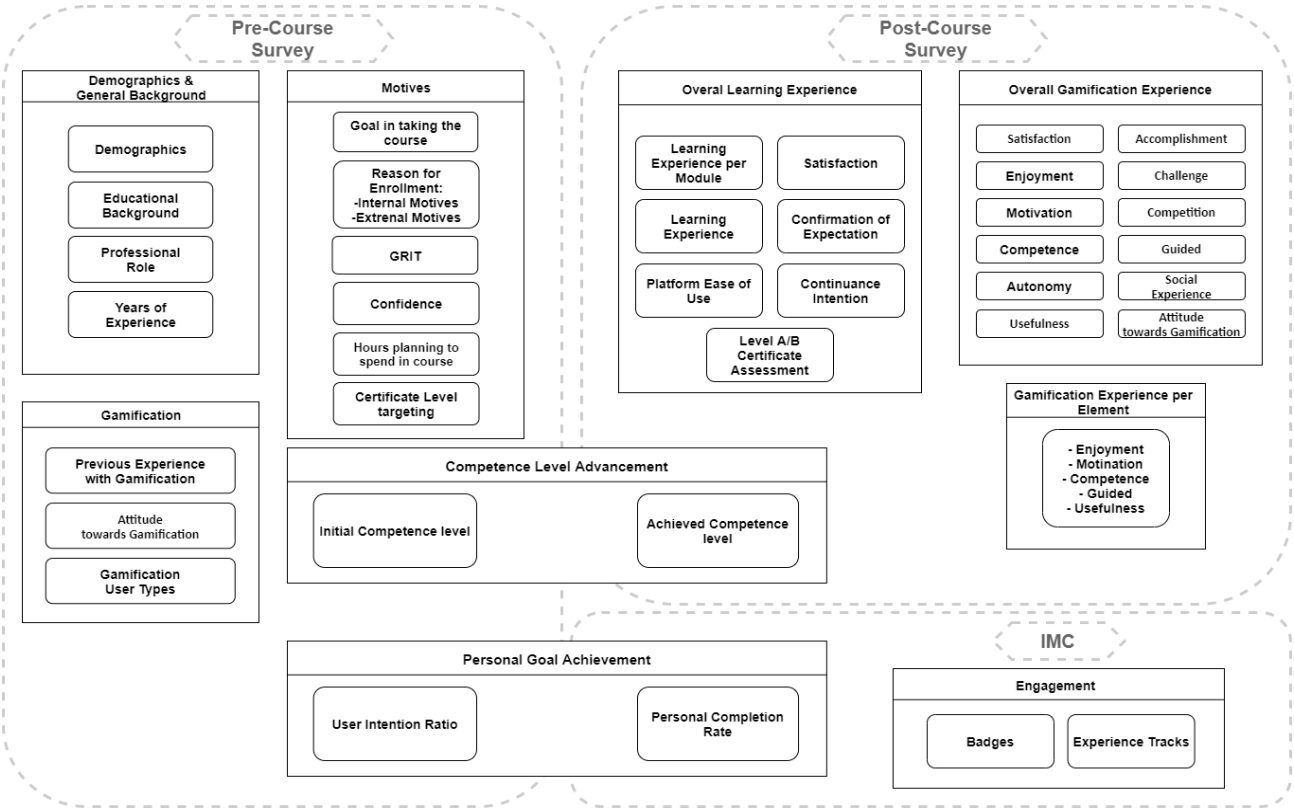


Figure 8: Pre- and Post-course survey elements of L2A MOOC Phase B

The implementation of the proposed framework in the gamified version of the MOOC, that was previously run and evaluated without the integration of gamification elements, leads to the formation of a control and an experimental group. Participants of L2A Phase A and Phase B are respectively considered as the control group and the experimental one. Therefore, the opportunity is given to have the two versions of Learn2Analyze MOOC compared and to add four more research dimensions to the previous ones:

- Is the learners' profile of the gamified version of the MOOC (Phase B) similar to the L2A MOOC Phase A learners' profile?
- Does the gamified version of the L2A MOOC have better course completion rate?
- Does the gamified version of the L2A MOOC have better reported EDL Level advancement?
- Does the gamified version of the L2A MOOC have better reported Learning Experience?

4.2 Procedure

1.	@ IMC's MOOC Platform: Course Registration and Enrolment Module 1 Orientation including a prompt and a link to the Pre-Course Survey @ Google Drive
2.	@ Google Drive Pre-Course Survey Consent Form If the participant agrees to participate 2.1 he/she answers the Pre-Course Survey Questionnaire and submits the form @Google Drive. 2.2 After the submission of the Pre-Course Survey, the participant will receive an email with the "verification code", which verifies his/her participation to the Pre-Course Survey. This code will be used in STEP 3 to unlock the MOOC content
3.	@ IMC's MOOC Platform: Module 1 - Part 2: Unlock your MOOC content Participant is requested to use the "verification code" s/he received in STEP 2 upon submission of the Pre-Course Survey, to unlock the MOOC content
4.	@ IMC's MOOC Platform 4.1 The participant completes the 8 weeks L2A MOOC 4.2 The participant takes the Level A and/or B Final Assessment Quiz If the score is below 60% he/she can retake the Level A and/or B Final Assessment Quiz (5 times) If the score in the Final Assessment Quiz is over 60% then A prompt and a link to the Post-Course survey @ Google Drive is revealed.
5.	@Google Drive Post-Course Survey Consent Form If the participant agrees to participate: 5.1 he/she answers the Pre-Course Survey Questionnaire and submits the form. 5.2 After submitting the Post-Course Survey the participant will automatically receive an email with the "verification code", which verifies his/her participation to the Post-Course Survey. This code will be used in STEP 6 to unlock the Level A and/or B Certificate
6.	@ IMC's MOOC Platform Participant is requested to use the "verification code" s/he received in STEP 5, upon submission of the Post-Course Survey, to unlock the Level A and/or B Certificate of Achievement, given that he/she have succeeded the corresponding final assessment quiz in STEP 4

To earn Level A and/or B Certificate of Achievement, the participant must:

- score at least 60% in the corresponding final assessment quiz, and
- participate in both Pre and Post-Course Surveys.

4.3 Instruments

Instruments used for data collection and analysis

The instruments that will be used for the implementation of the process are:

1. Two **consent forms**, one for each one of the two questionnaires (pre-course survey questionnaire and post-course survey questionnaire) seeking for L2A MOOC participants' permission for participation in these surveys and assuring them of the confidentiality of their responses. The consent forms include all the information needed (title of the survey, purpose and procedure, legal basis for processing the personal and sensitive data, potential benefits, potential risk or discomforts, storage of data, information about the data transfer outside the European Union, right to withdraw, rights of research participants, participant concerns and reporting, conflict of Interest, compensation, confidentiality, how will results be used, debriefing and dissemination of results) for the Learn2Analyze MOOC participants to consent or not in the respective survey. The consent forms follow the guidelines of the General Data Protection Regulation (EU) 679/2016 ('GDPR') the main data protection legal framework in EU directly applicable to all Member States, repealing the current Data Protection Directive 95/46/EC as of 25 May 2018 [Appendix A.2, A.4].
2. The **Pre-Course Survey Questionnaire** in a web form to collect the Learn2Analyze MOOC participants' replies in relation to their demographics, the educational/professional background, gamification experience, as well as the participants' motives for enrolling in the Learn2Analyze (L2A) MOOC, to create the participants' profile. The questionnaire consists of 8 sections and needs approximately 20-25 minutes to be filled in.

   The first three sections include information about the Learn2Analyze project, the consent form for participating to the survey, as well as guidelines to create and provide participant's Unique Code ID to match pre- and post- course survey answers. The next sections include:

   - a set of questions about demographics and general background e.g., Age, Gender, Nationality, Country of Residence, Educational Background, Professional Identity, Professional Experience, English proficiency, Comfort with technology and Previous Experience on MOOCs
   - a set of questions about participant's background and attitude towards Gamification
   - a set of questions about the participants' motives for enrolling in the Learn2Analyze MOOC
   - a set of questions on participants' existing competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework

The final section is asking for the participant's email address so that he/she can receive a verification code that proves he/she has participated in the Pre-Course Survey. [Appendix A.3].

3. The **Post-Course Survey Questionnaire** in a web form to collect the Learn2Analyze MOOC participants' replies in relation to participants' satisfaction, learning experiences, gamification experiences and course impact. The questionnaire consists of 6 sections and needs approximately 20 minutes to be filled in.

   The first three sections include information about the Learn2Analyze project, the consent form for participating to the survey, as well as guidelines to create and provide participant's Unique Code ID to match pre- and post- course survey answers.

   The next sections include:

   - a set of questions on participants' level of satisfaction and learning experience per module of the Learn2Analyze MOOC
   - a set of questions on participants' overall level of satisfaction and learning experience after attending the Learn2Analyze MOOC
   - a set of questions on participant's overall gamification experience after attending the Learn2Analyze (L2A) MOOC
   - a set of questions on participant's experience per every implemented gamification element after attending the Learn2Analyze (L2A) MOOC
   - a set of questions on learners' competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework, after attending the Learn2Analyze MOOC

   The final section is asking for the name and the email address of the participant so that he/she can receive a verification code that proves he/she has participated in the Post-Course Survey. [Appendix A.5].

4. **Platform data**

   IMC's MOOC Platform provides a set of limited data about users and their activities in Learn2Analyze MOOC. The data that are utilized for the survey are:

   - Number of Badges per user
   - Level of Experience Track per user
   - Course completion rate per user (Personal Completion Rate)
   - Participation in quiz learning activities
   - Participation in collaborative learning activities
   - Participation in concluding self-assessed assignments

   and refer to all the enrolled users having or not completed the course.

Privacy and ethical issues

In the consent forms, privacy and ethical issues are treated according to the guidelines of the General Data Protection Regulation (EU) 679/2016 (GDPR)[2]. To this end, participants are informed, in clear and plain language, about:

- the **name** of the consortium that is processing their personal data (including the contact details);
- the **purposes** for which the consortium will use their personal data;
- the categories of **personal data** concerned;
- the **length of time** for which their data will be stored;
- their **basic rights** in the field of data protection (for example, the right to have their data removed, right to access personal data);
- the right to **withdraw** their consent at any time;
- the right to lodge a complaint with a **Data Protection Authority** (DPA);
- whether their personal data will be **transferred** outside the EU;
- other companies/organisations that will **receive** their data;
- the **legal basis** for processing their personal data;

References

Alario-Hoyos, C., Estévez-Ayres, I., Pérez-Sanagustín, M., & Delgado-Kloos, C. (2017). Understanding Learners' Motivation and Learning Strategies in MOOCs. *International Review of Research in Open and Distance Learning 18*(3).

Alturkistani, A., Majeed, A., Car, J, & Brindley, D. (2018). *An evaluation of a Massive Open Online Course (MOOC) about data science for continuing education in healthcare (Preprint).* doi: 10.2196/preprints.10982

Anderman, E. M., Urdan, T., & Roeser, R. W. (2005). The Patterns of Adaptive Learning Survey. In *What Do Children Need to Flourish?*, pp.223-235.

Antonaci, A., Klemke, R., & Specht, M. (2019). The effects of gamification in online learning environments: A systematic literature review. *Informatics*, *6*(3), 1–22. https://doi.org/10.3390/informatics6030032

Antonaci, A., Klemke, R., Stracke, C. M., & Specht, M. (2017). Gamification in MOOCs to enhance users' goal achievement. *IEEE Global Engineering Education Conference, EDUCON*, *April*, 1654–1662. https://doi.org/10.1109/EDUCON.2017.7943070

Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). Gamification: A key determinant of massive open online course (MOOC) success. *Information and Management*, *56*(1), 39–54. https://doi.org/10.1016/j.im.2018.06.003

Baptista, G., & Oliveira, T. (2019). Gamification and serious games: A literature meta-analysis and integrative model. *Computers in Human Behavior*, *92*(October 2018), 306–315. https://doi.org/10.1016/j.chb.2018.11.030

Bayeck, R. Y. (2016). Exploratory study of MOOC learners' demographics and motivation: The case of students involved in groups. *Open Praxis, 8*(3), 223–233.

[2] http://eur-lex.europa.eu/eli/reg/2016/679/oj

Borras-Gene, O., Martiñez-nunez, M., & Fidalgo-Blanco, Á. (2016). New Challenges for the motivation and learning in engineering education using gamification in MOOC. *International Journal of Engineering Education*, *32*(1), 501–512.

Butler, C. (2014). A framework for evaluating the effectiveness of gamification techniques by personality type. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *8527 LNCS*, 381–389. https://doi.org/10.1007/978-3-319-07293-7_37

Castrillo, M. D., Martin-Monje, E., Vázquez-Cano, E. (2018). *Practical guide for MOOC tutoring and design.* MiriadaX - Telefónica Educación Digital

Christensen, G., Steinmetz, A., Alcorn, B., Bennett, A., Woods, D., & Emanuel E. (2013). The MOOC Phenomenon: Who Takes Massive Open Online Courses and Why? *SSRN Electronic Journal*. doi: 10.2139/ssrn.2350964

Daradoumis, T., Bassi, R., Xhafa, F., & Caballe, S. (2013). A Review on Massive E-Learning (MOOC) Design, Delivery and Assessment. *2013 Eighth International Conference on P2P, Parallel, Grid, Cloud and Internet Computing*. doi:10.1109/3pgcic.2013.37

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*. https://doi.org/10.2307/249008

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

Dichev, C., & Dicheva, D. (2017). *Gamifying education : what is known , what is believed and what remains uncertain : a critical review*. International Journal of Educational Technology in Higher Education. https://doi.org/10.1186/s41239-017-0042-5

Dillahunt, T., Chen, B., & Teasley, S. (2014). Model thinking: demographics and performance of MOOC students unable to afford a formal education. *Proceedings of the first ACM conference on Learning@Scale conference* (pp.145–146). NY, USA: ACM Retrieved from http://socialinnovations.us/assets/project-education/Dillahunt-WIP2.pdf

Dillahunt, T., Wang, Z., & Teasley, S. (2014). Democratizing Higher Education: Exploring MOOC Use Among Those Who Cannot Afford a Formal Education. I*nternational Review of Research in Open and Distance Learning, 15*(5). doi: 10.19173/irrodl.v15i5.1841

Dreyfus, S. E. (2004). The Five-Stage Model of Adult Skill Acquisition. Bulletin of Science, Technology & Society, 24(3), 177-181 doi: 10.1177/0270467604264992

Duckworth, A. L., & Quinn, P. D. (2009). Development and Validation of the Short Grit Scale (Grit–S). *Journal of Personality Assessment, 91*(2), 166-174. Retrieved from https://globaled.gse.harvard.edu/files/geii/files/validation_grit_scale_duckworth_jpa_m._figuero a-2.pdf

Duncan, T., & Mckeachie, W. J. (2010). The Making of the Motivated Strategies for Learning Questionnaire. *Educational Psychologist, 40*(2), 117-128.

Egloffstein, M., Ebner, B., & Ifenthaler, D. (2019). Digital Learning from scratch: Initiating MOOCs within a Business School. *Proceedings of EMOOCs 2019, 2356*, 121-127.

Egloffstein, M., & Schwerer, F. (2019). Participation and Achievement in Enterprise MOOCs for Professional Development: Initial Findings from the openSAP University. In D. Sampson et al. (Eds.), *Learning Technologies for Transforming Large-Scale Teaching, Learning, and Assessment* (pp. 91-103). Cham: Springer.

Ehlers, Ulf. (2004). Quality in e-learning from a learner's perspective. *European Journal for Distance and Open Learning*.

European Commission. (2018). What information should I receive when I provide my personal data? Retrieved from : https://ec.europa.eu/info/law/law-topic/data-protection/reform/rights-citizens/my-rights/what-information-should-i-receive-when-i-provide-my-personal-data_en

Farzan, R., DiMicco, J. M., Millen, D. R., Brownholtz, B., Geyer, W., & Dugan, C. (2008). Results from deploying a participation incentive mechanism within the enterprise. *Conference on Human Factors in Computing Systems - Proceedings*. https://doi.org/10.1145/1357054.1357145

Gamage, D., Fernando, S., & Perera, I. (2015). Quality of MOOCs: A review of literature on effectiveness and quality aspects. *2015 8th International Conference on Ubi-Media Computing (UMEDIA)*. doi:10.1109/umedia.2015.7297459

Gil-Jaurena, I., Callejo-Gallego, J., & Agudo, Y. (2017). Evaluation of the UNED MOOCs Implementation: Demographics, Learners Opinions and Completion Rates. *The International Review of Research in Open and Distributed Learning, 18*(7). doi:10.19173/irrodl.v18i7.3155

Guo P. J., & Reinecke, K. (2014). Demographic differences in how students navigate through MOOCs. *Proceedings of the first ACM conference on Learning @ scale conference.* doi: 10.1145/2556325.2566247

Hamari, J. (2013). Transforming homo economicus into homo ludens: A field experiment on gamification in a utilitarian peer-to-peer trading service. *Electronic Commerce Research and Applications*, *12*(4), 236–245. https://doi.org/10.1016/j.elerap.2013.01.004

Hamari, J. (2017). Do badges increase user activity? A field experiment on the effects of gamification. *Computers in Human Behavior*, *71*, 469–478. https://doi.org/10.1016/j.chb.2015.03.036

Hamari, J., & Koivisto, J. (2015). Why do people use gamification services? *International Journal of Information Management*, *35*(4), 419–431. https://doi.org/10.1016/j.ijinfomgt.2015.04.006

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? - A literature review of empirical studies on gamification. *Proceedings of the Annual Hawaii International Conference on System Sciences*, 3025–3034. https://doi.org/10.1109/HICSS.2014.377

Hansen, J.D., & Reich, J. (2015). Socioeconomic Status and MOOC Enrollment: Enriching Demographic Information with External Datasets. *Fifth International Conference on Learning Analytics And Knowledge*, 59-63. doi: 10.1145/2723576.2723615

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers and Education*, *80*, 152–161. https://doi.org/10.1016/j.compedu.2014.08.019

Hennis, T., Topolovec, S., Poquet, O., & De Vries, P. (2016). Who is the Learner: Profiling the Engineering MOOC Student. *SEFI 44th Annual Conference*. At Tampere, Finland.

Hennis, T., Skrypnyk, O., & De Vries, P. (2015). Who is the Learner in the DelftX Engineering MOOCs? *International Joint Conference on the Learner in Engineering Education (IJCLEE 2015)*. San Sebastian.

Ho, A. D., Chuang, I., Reich, J., Coleman, C., Whitehill, J., Northcutt, C., Williams, J. J., Hansen, J., Lopez, G., & Petersen, R. (2015). *HarvardX and MITx: Two years of open online courses (HarvardX Working Paper No. 10).*doi:10.2139/ssrn.2586847

Hood, N., & Littlejohn, A. (2016). *Quality in MOOCs: Surveying the Terrain.* Commonwealth of Learning.

Hone, K. S., & Said, G. R. (2016). Exploring the factors affecting MOOC retention: A survey study. *Computers & Education, 98*, 157-168. doi:10.1016/j.compedu.2016.03.016

Högberg, J., Hamari, J., & Wästlund, E. (2019). Gameful Experience Questionnaire (GAMEFULQUEST): an instrument for measuring the perceived gamefulness of system use. In *User Modeling and User-Adapted Interaction* (Vol. 29, Issue 3). Springer Netherlands. https://doi.org/10.1007/s11257-019-09223-w

Johnson, D., Gardner, M. J., & Perry, R. (2018). Validation of two game experience scales: The Player Experience of Need Satisfaction (PENS) and Game Experience Questionnaire (GEQ). *International Journal of Human Computer Studies*, *118*(February), 38–46. https://doi.org/10.1016/j.ijhcs.2018.05.003

Jordan, K. (2014). Initial trends in enrolment and completion of massive open online courses. *The International Review of Research in Open and Distributed Learning, 15*(1). doi:10.19173/irrodl.v15i1.1651

Jung, I. (2011). The Dimensions of E-Learning Quality: From the Learner's Perspective. *Educational Technology Research and Development*, 59(4), 445-464. Retrieved June 4, 2019 from https://www.learntechlib.org/p/50898/.

Karra, S., Karampa, V., & Paraskeva, F. (2019). Gamification Design Framework Based on Self Determination Theory for Adult Motivation. In *Communications in Computer and Information Science* (Vol. 1011). Springer International Publishing. https://doi.org/10.1007/978-3-030-20798-4_7

Khalil, H., & Ebner, M. (2014). MOOCs completion rates and possible methods to improve retention – A literature review. In J.Viteli & M. Leikomaa (Eds.), *Proceedings of EdMedia: World Conference on Educational Media and Technology 2014* (pp. 1305–1313). Tampere, Finland: Association for the Advancement of Computing in Education (AACE).

Kizilcec, R. F., Piech, C., & Schneider, E. (2013). Deconstructing disengagement: Analyzing learner subpopulations in massive open online courses. In *3rd International Conference on Learning Analytics and Knowledge*, LAK 2013 (pp. 170–179).New York, NY: Association of Computing Machinery.

Koivisto, J., & Hamari, J. (2014). Demographic differences in perceived benefits from gamification. *Computers in Human Behavior*, *35*, 179–188. https://doi.org/10.1016/j.chb.2014.03.007

Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management*, *45*(October 2018), 191–210. https://doi.org/10.1016/j.ijinfomgt.2018.10.013

Koller, D., Ng, A., Do, C., & Chen, Z. (2013). Retention and intention in Massive Open Online Courses: In depth. EDUCAUSE Review. Retrieved from https://er.educause.edu/articles/2013/6/retention-and-intention-in-massive-open-online-courses-in-depth

Lester, S. (2005). *Novice to Expert: the Dreyfus model of skill acquisition.* Stan Lester Developments. Retrieved June 4, 2019 from: http://devmts.org.uk/dreyfus.pdf

Lim, D. H., & Kim, H. (2003). Motivation and Learner Characteristics Affecting Online Learning and Learning Application. *Journal of Educational Technology Systems*, *31*(4), 423–439. https://doi.org/10.2190/0lw0-ke8x-mdyh-x27f

Liyanagunawardena, T. R., Adams, A. A., & Williams, S. A. (2013). MOOCs: A Systematic Study of the Published Literature 2008-2012. *The International Review of Research in Open and Distance Learning*, *14*(3), 202-227.

Loorbach, N., Peters, O., Karreman, J., & Steehouder, M. (2015). Validation of the Instructional Materials Motivation Survey (IMMS) in a self-directed instructional setting aimed at working with technology. *British Journal of Educational Technology*, *46*(1), 204–218. https://doi.org/10.1111/bjet.12138

Majuri, J., Koivisto, J., & Hamari, J. (2018). Gamification of education and learning: A review of empirical literature. *CEUR Workshop Proceedings*, *2186*, 11–19.

Marczewski, A. (2015). Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Desig. In *Gamified UK* (pp. 65–80). http://www.amazon.co.uk/Even-Ninja-Monkeys-Like-Play/dp/1514745666/

Martí-Parreño, J., Seguí-Mas, D., & Seguí-Mas, E. (2016). Teachers' Attitude towards and Actual Use of Gamification. *Procedia - Social and Behavioral Sciences*, *228*(June), 682–688. https://doi.org/10.1016/j.sbspro.2016.07.104

McCrae, R. R., & John, O. P. (1992). An Introduction to the Five-Factor Model and Its Applications. *Journal of Personality*, *60*(2). https://doi.org/10.1111/j.1467-6494.1992.tb00970.x

Mougiakou, S. (2020). *An evaluation framework for Massive Open Online Courses for Professional Development (MOOCs4PD): the case of the Learn2Analyze MOOC* [University of Piraeus]. https://doi.org/10.26267/unipi_dione/213

Myers, I. B. ; McCaulley, M. H. (1985). Manual: A Guide to the Development and Use of the Myers-Briggs Type Indicator. *Consulting Psychologists Press*, *15*, 3–4.

Myers, I. B. (1962). The Myers-Briggs Type Indicator: Manual (1962). In *The Myers-Briggs Type Indicator: Manual (1962).* Consulting Psychologists Press. https://doi.org/10.1037/14404-000

Perris, K. (2015). Massive Open Online Course (MOOC) on MOOCs: Course Evaluation. *Commonwealth of Learning.*

Rienties, B., Toetenel, L. (2016). The impact of learning design on student behaviour, satisfaction and performance: a cross-institutional comparison across 151 modules. *Computers in Human Behavior*, (60). 333-341.

Rizzardini, R. H., Chan, M. M., & Guetl, C. (2016). An Attrition Model for MOOCs: Evaluating the Learning Strategies of Gamification. In *Formative Assessment, Learning Data Analytics and Gamification: In ICT Education*. Elsevier Inc. https://doi.org/10.1016/B978-0-12-803637-2.00014-2

Romero-Rodriguez, L. M., Ramirez-Montoya, M. S., & Gonzalez, J. R. V. (2019). Gamification in MOOCs: Engagement Application Test in Energy Sustainability Courses. *IEEE Access*, *7*, 32093–32101. https://doi.org/10.1109/ACCESS.2019.2903230

Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, *30*(4), 347–363. https://doi.org/10.1007/s11031-006-9051-8

Shrader, S., Wu, M., Owens, D., & Ana, K. S. (2016). Massive Open Online Courses (MOOCs): Participant Activity, Demographics, and Satisfaction. *Online Learning, 20*(2). doi: 10.24059/olj.v20i2.596

Stracke, C. M. (2017). The Quality of MOOCs: How to Improve the Design of Open Education and Online Courses for Learners? *Lecture Notes in Computer Science Learning and Collaboration Technologies. Novel Learning Ecosystems,* 285-293. doi: 10.1007/978-3-319-58509-3_23

Sun, P. C., Tsai, R. J., Finger, G., Chen, Y. Y., & Yeh, D. (2008). What drives a successful eLearning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, 50(4), 1183-1202.

Taylor-Powell, E., & Renner, M. (2009). Collecting Evaluation Data: End-of-Session Questionnaires. *Program Development and Evaluation.* University of Wisconsin-Extension.

Tempelaar, D. T., Rienties, B., & Giesbers, B. (2015). Stability and sensitivity of Learning Analytics based prediction models. In M., Helfert, M. T., Restivo, S., Zvacek, & J., Uho (Eds.). *Proceedings of 7th International conference on Computer Supported Education*, 156–166. Lisbon, Portugal.

Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., Marczewski, A., & Nacke, L. E. (2016). The gamification user types Hexad scale. *CHI PLAY 2016 - Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play*, 229–243. https://doi.org/10.1145/2967934.2968082

Tondello, G., Kappen, D., Mekler, E., Ganaba, M., & Nacke, L. (2016). Heuristic Evaluation for Gameful Design. In *CHI PLAY Companion '16: Proceedings of the 2016 Annual Symposium on*

Computer-Human Interaction in Play Companion Extended Abstracts. https://doi.org/10.1145/2968120.2987729

Torres-Toukoumidis, A., Romero-Rodríguez, L. M., Pérez-Rodríguez, M. A., & Björk, S. (2018). Integrated theoretical gamification model in E-learning environments (E-MIGA) [Modelo teórico integrado de gamificación en ambientes E-learning (E-MIGA)]. *Revista Complutense de Educacion*, *29*(1), 129–145. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85038808578&doi=10.5209%2FRCED.52117&partnerID=40&md5=0bce46ed8cc4bee80931d501d4ecc115

Tsay, C. H. H., Kofinas, A., & Luo, J. (2018). Enhancing student learning experience with technology-mediated gamification: An empirical study. *Computers and Education*, *121*, 1–17. https://doi.org/10.1016/j.compedu.2018.01.009

Van Der Heijden, H. (2004). Van der Heijden/Hedonic Information Systems In researce User Acceptance of Hedonic information systems. *Source: MIS Quarterly*, *28*(4), 695–704.

Veletsianos, G., & Shepherdson, P. (2016). A Systematic Analysis and Synthesis of the Empirical MOOC Literature Published in 2013–2015. *The International Review of Research in Open and Distributed Learning*. 17. 10.19173/irrodl.v17i2.2448.

Urbach, N., Smolnik, S., & Riempp, G. (2010). An empirical investigation of employee portal success. *Journal of Strategic Information Systems*, *19*(3), 184–206. https://doi.org/10.1016/j.jsis.2010.06.002

Wang, Y., & Baker, R. (2018). Grit and intention: Why do learners complete MOOCs? *International Review of Research in Open and Distance Learning 19*(3).

Wilkowski, J., Deutsch, A., & Russell, D. M. (2014). Student skill and goal achievement in the mapping with google MOOC. *Proceedings of the First ACM Conference on Learning @ Scale Conference - L@S 14*. doi:10.1145/2556325.2566240

Woodgate, A., Macleod, H., Scott, A., & Haywood, J. (2015). Differences in online study behaviour between sub-populations of MOOC learners. *Educacion xx1*, 18(2), 147–163. http://dx.doi.org/10.5944/educXX1.13461

Youssef, Y. (2015). *GAMIFICATION IN E LEARNING*. https://doi.org/10.13140/RG.2.1.4613.4162

15-point Post-Course Evaluation Checklist for eLearning Developers. (2017, March 24). Retrieved from https://www.efrontlearning.com/blog/2015/07/15-point-post-course-evaluation-checklist-for-elearning-developers.html

60 Questions to Ask in a Post-training Evaluation Survey. (2019, May 27). Retrieved from https://www.talentlms.com/blog/questions-post-training-evaluation-survey/

Creating a Course Evaluation Survey that Captures Informative Student Feedback. (2018, March 01). Retrieved from https://www.formstack.com/blog/2018/course-evaluation-survey/

MichiganX: PLAx. (2016, August 1). Practical Learning Analytics. Post-course survey. Retrieved from https://umich.qualtrics.com/jfe/form/SV_735AxMay2FSApSZ?redirect=SV_9ukuaMa1VKYV9C5&edx_user_id=1106c064f37e167af204554e4f14d74a&platform_id=edx&course_id=PLAx&Q_JFE=qdg

OT12 MOOC - Evaluation. (n.d.). Retrieved from https://www.surveymonkey.com/r/Z6RMVQN

PennX: BDE1x. (2018, June 12). Big Data and Education. Course Exit Survey. Retrieved from https://tccolumbia.qualtrics.com/jfe/form/SV_4YZSI2pgcXbQVNP?uid=1106c064f37e167af204554e4f14d74a

Appendix A.1: Invitation for the Learn2Analyze MOOC Evaluation

Title of Survey: Evaluation of the Learn2Analyze MOOC

Dear Participant,

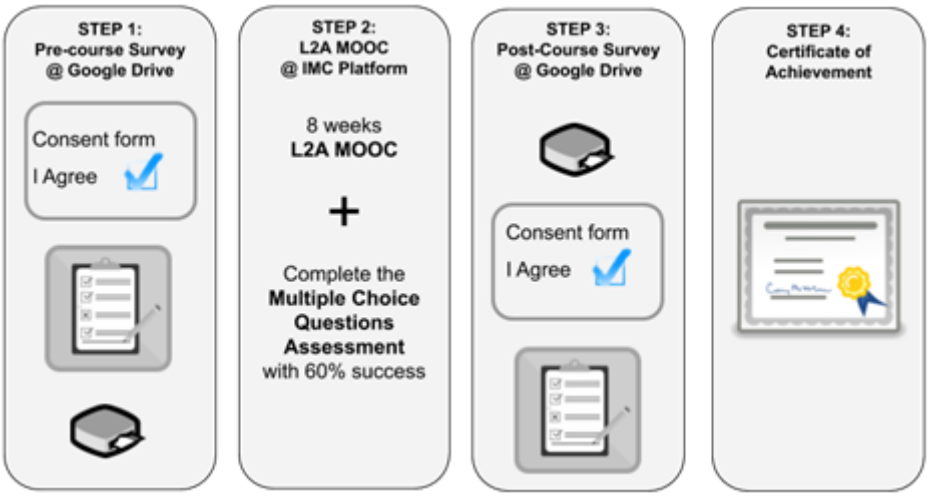
You are invited to participate in the **Learn2Analyze MOOC Evaluation** survey as you have registered for the online course administered by the Learn2Analyze Consortium. Your responses to this survey will help us to evaluate the Learn2Analyze MOOC and improve it in future versions. Your participation will involve completing two questionnaires: one at the beginning of the course (Pre-Course Survey) and one at the end (Post-Course Survey).

In the Pre-Course Survey, you will be asked to provide answers to a series of questions related to your demographics and general background, your background and attitude towards Gamification, your motives for enrolling in the Learn2Analyze (L2A) MOOC and your existing competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework.

In the Post-Course Survey, you will be asked questions about your level of satisfaction and learning experience per module, as well as the overall learning experience of the Learn2Analyze (L2A) MOOC, your overall gamification experience after attending the Learn2Analyze (L2A) MOOC, as well as your experience per every implemented gamification element. Finally, you will report on your achieved competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework, after attending the Learn2Analyze (L2A) MOOC.

To obtain your L2A Level A or/and Level B Certificate of Achievement, it is necessary to complete both surveys. Each survey is expected to take approximately 20-25 minutes to complete.

Upon completion of the Pre-Course Survey you will receive the **Learn2Analyze MOOC "Unlock Code"**. You have to use this code as a key to unlock the Learn2Analyze MOOC content.



Upon completion of the post-course survey you will receive another verification code. You will be asked to fill in this code to download your Level A and/or B Certificate.

We greatly appreciate your willingness to share your time by participating. Your responses to these surveys will help us to improve the quality of the learning experience and to improve our course offerings.

On behalf of the Learn2Analyze Consortium, we express our sincere thanks for your participation in our survey acknowledging that your insights on the questions in this survey will prove invaluable.

Course Certificate

There are two levels of the L2A Certificate of Achievement: Level A Certificate and Level B Certificate of Achievement on Educational Data Literacy.

L2A Certificate of Achievement Level A requires developing a basic set of competences for EDL. In order to gain your **Certificate of Achievement Level A** you must gain a mark of 60% or greater overall to the corresponding set of level A 100 multiple choice quiz questions, aiming to assess your understanding of the core concepts presented in the 6 core modules.

L2A Certificate of Achievement Level B requires demonstration of a higher expertise assessed through hands-on assignments based on simulated practice scenarios. More specifically, for the Certificate of Achievement Level B, there is a final concluding assessment, where you are requested to undertake complex tasks, by going through several steps (e.g. by following a use case) and answer a set of 100 Multiple-Choice Questions (MCQs) which are automatic graded by the platform. In order to gain your **Certificate of Achievement Level B** you must gain a mark of **60% or greater** overall to the corresponding set of 100 level B multiple choice quiz questions.

Both sets of Multiple Choice Questions are included at the end of the course and you may complete the Multiple Choice Questions Assessments **at any time** as there are no 'due dates'.

If you successfully complete this course you will receive a **Certificate of Achievement (Level A or Level B or both)**. Successful completion of the course requires:

- completing the corresponding **Multiple Choice Questions Assessment** for Level A and/or Level B Certificate (with **60% success each to obtain both Levels)**
- completing the **Pre-course** and the **Post-course Surveys**

Appendix A.2: Learn2Analyze MOOC Pre-course survey Consent Form

Learn2Analyze MOOC Pre-course survey Consent Form

You are invited to participate in the Learn2Analyze MOOC Pre-Course Survey. Your responses to this survey will help us to evaluate the Learn2Analyze MOOC and improve it in future versions.

The survey is expected to take approximately 25 minutes to complete. You will be asked to provide answers to a series of questions related to your demographics and general background, your background and attitude towards gamification, your motives for enrolling in the Learn2Analyze (L2A) MOOC and your existing competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework. Upon completion of the Pre-Course Survey you will receive the Learn2Analyze MOOC "Unlock Code". After the course opening (1st of March 2021), you can return to the Learn2Analyze MOOC (https://learn2analyze.imc-learning.de) and use this code as a key to unlock the Learn2Analyze MOOC content.

We greatly appreciate your willingness to share your time by participating. Your responses to these surveys will help us to improve the quality of the learning experience and to better our course offerings.

On behalf of the Learn2Analyze Consortium, we express our sincere thanks for your participation in our survey acknowledging that your insights on the questions in this survey will prove invaluable.

1. How did you learn about the Learn2Analyze MOOC?
    - A Mailing List
    - A Facebook Group posting
    - A LinkedIn Group posting

- A Twitter Group posting
- A Ning Group posting
- A Blog Posting
- A Newsletter Posting
- An Article Posted Online or Printed
- A MOOC Aggregator or Course Catalogue Posting
- A Physical Event
- Other

2. Please define (name which one)

   _____

* Required

Consent form to Participate in Web-based Survey

Title of Survey: Learn2Analyze MOOC Pre-course survey Questionnaire

Purpose and Procedure:

The Learn2Analyze (L2A) is an Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' (Instructional Designers and e-Trainers) Competences in Educational Data Analytics. Learn2Analyze (L2A) is an action co-funded by the European Commission through the Erasmus+ Program of the European Union (Cooperation for innovation and the exchange of good practices - Knowledge Alliances, Agreement n. 2017-2733 / 001-001, Project No 588067-EPP-1-2017-1-EL-EPPKA2-KA).

More information about the project is available at www.learn2analyze.eu.

Please note:

1. The survey will be carried out from 01/02/2021 to 01/05 /2021.
2. Before you proceed to the survey questions, you will be asked to indicate your consent.
3. Should you decide you do not wish to further participate, you may leave the survey at any time, just by exiting your browser.
4. The questionnaire consists of 6 sections and needs approximately 20-25 minutes to be completed.
5. The first section includes the consent form for participating in the survey.
6. The second section includes a set of questions about demographics and general background.
7. The third section includes a set of questions about your background and attitude towards Gamification

8. The fourth section includes a set of questions on your motives for enrolling in the Learn2Analyze (L2A) MOOC.
9. The fifth section includes a set of questions on your existing competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework.
10. In the final section, you will be asked for your email address in order to receive the Learn2Analyze MOOC "Unlock Code". You will need it as a key to unlock the Learn2Analyze MOOC content, after the 1st of March 2021, when the course starts.

Legal basis for processing the personal and sensitive data:
Personal Data:
In connection with this research, the Learn2Analyze Consortium's collection and processing of the following Personal Data is lawful based on consent (Article 6.1(a), GDPR):
□ Name, Email Address
□ Education Information
Sensitive Data:
In connection with this research, the Learn2Analyze Consortium's collection and processing of the following Sensitive Data is lawful based on consent (Article 9.2(a), GDPR):
□ Gender

Potential Benefits:
There are no direct benefits for participating in the survey. The survey results will help us evaluate the L2A MOOC and improve its future versions.

Potential Risk or Discomforts:
We do not perceive of any risk or discomfort in the completion of the survey.

Storage of Data:
The survey is completed in a Google Docs form and stored in a secure Google Drive folder under the e-mail l2a.r12.survey@gmail.com, for the time required by the purposes described in this document, for maximum 2 years.

Data transfer outside the European Union:
We may share some of the data collected with services located outside the European Union, in particular through the aforementioned Google services.

Right to Withdraw:
Your participation in this survey is voluntary. You are under no obligation to complete the survey and you can withdraw from the survey prior to submitting it. If you do not want to participate simply stop participating or close the browser window. You can simply exit the Web Browser without saving your responses, and they will not be recorded.

Rights of research participants:
You have the right to request access to, a copy of, rectification, restriction in the use of, or erasure of your information in accordance with all applicable laws, contacting the lead Learn2Analyze researcher for this survey in l2a.r12.survey@gmail.com. The erasure of your

information shall be subject to the Learn2Analyze Consortium's need to retain certain information pursuant to any other identified lawful basis.

If the Learn2Analyze Consortium's use of your information is pursuant to your consent, you have the right to withdraw consent without affecting the lawfulness of the Learn2Analyze Consortium's use of the information prior to receipt of your request.

If you think your data protection rights have been breached, you have the right to lodge a complaint with your national Data Protection Authority (DPA).

Participant Concerns and Reporting:
If you have any questions concerning the survey or experience any discomfort related to the survey, please contact the lead Learn2Analyze researcher for this survey in l2a.r12.survey@gmail.com

Conflict of Interest:
We do not perceive any conflicts of interest in the development of this survey.

Compensation:
There is no compensation for participants in this survey.

Confidentiality:
The only people processing your input will be the researcher(s) involved in the Learn2Analyze project. The researcher(s) undertake to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the entire participating group and not from the perspective of an individual. Please note that confidentiality cannot be guaranteed while data are in transit over the Internet.

How will results be used:
The results of the survey will be used for evaluating the L2A MOOC. The results from the survey may be used for research study, for scholarly purposes only and might be presented in conferences, published in journals or articles for educational purposes.

By indicating consent to participate in this survey you also indicate consent for the possible secondary use of this data at a later date if we decide to undertake a further longitudinal study for the enhancement of the Learn2Analyze MOOC.

Debriefing and Dissemination of Results:
The final report will be made publicly available through the official website of the project www.learn2analyze.eu.

On behalf of the Learn2Analyze Consortium, we would like to sincerely thank you for your participation in our survey acknowledging that your insights on the questions in this survey will prove invaluable.

Selecting "I Agree" below indicates that:

You have read the above information;

You voluntarily agree to participate in this survey;
You understand the procedures described above;
You give consent for the use of your Personal Data for the purposes outlined in this notice;
You give consent for the use of your Sensitive Data for the purposes outlined in this notice;
You are at least 18 years of age.

Do you consent? *

● I AGREE

Appendix A.3: Pre-course Survey Questionnaire

To create your unique code ID please use:

1. The first letter of your first name (e.g. U)
2. The last 2 digits of your cell phone (if none use 00) (e.g. 17)
3. Your month of birth (e.g. 03)
4. The first letter of your middle name (if none, use X) (e.g. M)
5. The first letter of city/town you were born in (e.g. V)

(The above example would generate the unique code ID: U1703MV)

Please provide your unique code ID as per instructions:

_____

1. Demographics & General Background

You will be asked to provide answers to a series of questions related to your demographics and educational/professional background.

Number of questions in current section: 12

Q1*. What is your year of birth? *[2], [9], [11], [12]*
- Please enter:

Q2*. What is your gender? *[1], [9], [11], [12]*
- Female
- Male
- I prefer not to answer
- Other

Q3*. Please specify your country or region of residence. *[1], [8], [9]*
The countries will be in alphabetical order for someone to choose from a dropdown menu.

Q4*. What is the highest level of education you have completed? *[1], [2], [5], [8], [11], [12]*
- High School Diploma (or equivalent)
- Associate degree / technical diploma - occupational / technical / vocational program
- Associate degree - academic program
- Bachelor's degree (e.g., BSc, BA, AB, BS, BPS)
- Master's Degree (e.g., MA, MS, MSc, MEng, MEd, MSW, MBA)
- Professional School Degree (e.g., JD, MD, DDS, DVM, LLB)

- Doctoral Degree (e.g., PhD, EdD)
- Other. Please specify: (fill-in-blank)

Q5*. What is your current job sector? *[12]*

- Self-employed
- Large (>100 people) for-profit company
- Small (<100 people) for-profit company
- Large (>100 people) non-profit
- Small (<100 people) non-profit
- K-12 Education
- College
- University
- Governmental Education Agency
- Other Governmental Agency
- Not-employed
- Other. Please specify: (fill-in-blank)

Q6*. What is your professional role? (Select all that apply) *[9]*

- ❑ Higher Education Students
- ❑ Professional Instructional Designer of Online and/or Blended Courses
- ❑ (e-) Tutor of Online and or Blended Courses
- ❑ School Teacher in K-12 Education
- ❑ Professional involved in supporting Teaching & Learning in Higher Education and/or Professional involved in supporting Professional Development
- ❑ Professional involved in supporting Educational Data in Higher Education and/or Professional Development
- ❑ Manager in a Higher Education Institute
- ❑ Manager in a Professional Development Service Provider
- ❑ Manager in an e-Learning Service Provider
- ❑ Manager in a Governmental Education Policy Making Institute
- ❑ Academic involved in teaching Higher Education Courses on Digital Learning and/or Learning Technologies
- ❑ Academic involved in teaching Higher Education Courses specifically for Instructional Designers and/or (e-) Tutors
- ❑ Academic involved in teaching Higher Education Courses specifically for Educational Data Literacy
- ❑ Researcher in Digital Learning and/or Learning Technologies
- ❑ Researcher in Instructional Design of Online and/or Blended Courses
- ❑ Researcher in Educational Data Literacy
- ❑ Other. Please specify: (fill-in-blank)

Q7*. How many years are you involved in this role? *[8], [9]*

- 1-5
- 6-10
- 11-20
- 21+

Q8*. How many years are you involved in the field of Digital Teaching and Learning? *[1], [8], [9]*

- 1-5
- 6-10
- 11-20
- 21+

Q9*. On a scale from 1 (low) to 5 (high), please rate your English proficiency: *[11]*

(Low) 1 2 3 4 5 (High)

Q10*. On a scale from 1 (low) to 5 (high), please rate your comfort with Technology: *[11]*

(Low) 1 2 3 4 5 (High)

Q11*. In how many MOOCs have you enrolled? *[5], [8], [11]*

None 1 2-4 5-10 >10

Q12*. How many MOOCs have you completed successfully? *[5], [8], [11]*

None 1 2-4 5-10 >10

3. Gamification

You will be asked to provide answers to a series of questions related to your background and attitude towards Gamification, as well as, to rate your intrinsic and extrinsic motivation that determines your player type.

Number of questions in current section: 6

Q1*. Are you familiar with gamification in teaching and learning?

- Yes
- No

Q2*. Have you experienced gamified learning experiences in the past?

- Yes
- No

Q3*. In how many gamified MOOCs have you take part?

- None
- 1
- 2-4

- 5-10
- >10

Q4*. Have you used gamification in your educational design?

- Yes
- No

Q5*. Attitude towards Gamification *[14]*

Please select the number [1..5] that best describes what you think.

	Not at all true	2	Somewhat true	4	Very true	Not Applicable
My attitude towards gamification is favorable.						

Q6*. Gamification User Types based on intrinsic and extrinsic motivation *[15]*

Please rate your agreement to the following statements from 1= "Strongly Disagree to 7= "Strongly Agree":

	1	**2**	**3**	**4**	**5**	**6**	**7**
SOC1. Interacting with others is important to me.							
PHIL1. It makes me happy if I am able to help others.							
FS1. It is important to me to follow my own path.							
SOC2. I like being part of a team.							
DIS1. I like to provoke.							
PR1. I like competitions where a prize can be won.							
SOC3. It is important to me to feel like I am part of a community.							
FS2. I often let my curiosity guide me.							
DIS2. I like to question the status quo.							
PR2. Rewards are a great way to motivate me.							
FS3. I like to try new things.							
AR1. I like defeating obstacles.							
PHIL2. I like helping others to orient themselves in new situations.							
DIS3. I see myself as a rebel.							

SOC4. I enjoy group activities.							
AR2. It is important to me to always carry out my tasks completely.							
DIS4. I dislike following rules.							
PHIL3. I like sharing my knowledge							
AR3. It is difficult for me to let go of a problem before I have found a solution.							
PR3. Return of investment is important to me.							
FS4. Being independent is important to me.							
AR4. I like mastering difficult tasks.							
PHIL4. The well-being of others is important to me.							
PR4. If the reward is sufficient, I will put in the effort.							

3. Motives for enrolling in the L2A MOOC

You will be asked to answer a series of questions on your motives for enrolling in the Learn2Analyze (L2A) MOOC.

Number of questions in current section: 6

Q1*. Which of the following best describes your goal in taking this course? Please select one of the following *[1], [6], [12]*

- Planning to follow the course schedule and complete all activities to earn a certificate of completion
- Auditing, but intend to follow the course schedule
- Auditing, but do not intend to follow the course schedule
- Just checking what this course is about
- Bookmaking it as a learning resource
- Interested in a small subset of course topics
- General curiosity
- Other - Please specify

Q2*. Can you tell us why you have enrolled in this course? Please select the number [1..5] that best describes what you think. (N/A=Not Applicable)

1. Participating in this course is relevant for my personal development**.** *[1], [2], [5], [11], [13]*
   Not At All True 1 2 3 4 5 Very True N/A

2. Participating in this course will extend my current knowledge of the topic. *[2], [11] [12]*

   Not At All True 1 2 3 4 5 Very True N/A

3. I will use this course to obtain a job-relevant qualification. *[5]*

   Not At All True 1 2 3 4 5 Very True N/A

4. I think the L2A certificate is beneficial for my CV and future job applications. *[5]*

   Not At All True 1 2 3 4 5 Very True N/A

5. The subject of the course is relevant to my academic field of study. *[2], [12]*

   Not At All True 1 2 3 4 5 Very True N/A

6. The subject of the course is relevant to my college/university class. *[2], [12]*

   Not At All True 1 2 3 4 5 Very True

7. I have been advised or ordered to take part in this course. *[5]*

   Not At All True 1 2 3 4 5 Very True N/A

8. I have enrolled in this course out of general curiosity. *[5]*

   Not At All True 1 2 3 4 5 Very True N/A

Q3*. How confident are you in your ability to learn the material in this course? *[10], [11]*

- Not confident at all
- A little confident
- Moderately confident
- Very confident
- Extremely confident

Q4*. How would you rate your possibility of finishing this course according to the anticipated time commitment as defined in the syllabus? Please select a number on a scale of 1 to 5, with 1 being least likely and 5 being most likely. *[12]*

Least Likely 1 2 3 4 5 Most likely

Q5*. How many hours per week do you plan to spend studying on this course? *[11]*

- less than 3 hours
- 3-4 hours
- 5-6 hours
- 7-8 hours
- more than 8 hours

Q6*. What is the percentage of the course you intend to complete?

- 0%-20%
- 21%-40%
- 41%-60%
- 61%-80%
- 81%-100%

Q7*. Do you target Certificate Level A (core EDL competences), Certificate Level B (advanced EDL competences) or both?

- Certificate Level A
- Certificate Level B
- Both
- None

Q8*. How would you describe yourself?

Please select the choice that best describes what you think.

1. New ideas and projects sometimes distract me from previous ones. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

2. Setbacks don't discourage me. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

3. I have been obsessed with a certain idea or project for a short time but later lost interest. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

4. I am a hard worker. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

5. I often set a goal but later choose to pursue a different one. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

6. I have difficulty maintaining my focus on projects that take more than a few months to complete. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

7. I finish whatever I begin. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

8. I am diligent. *[4], [12]*
   1 Very Much like me 2 Mostly like me 3 Somewhat like me
   4 Not much like me 5 Not like me at all

4. Existing Competence Level per L2A EDL-CP Statement

Please rate your initial competence level for each statement of the L2A Educational Data Literacy Competence Dimensions addressed in this course. *[3], [11]*

Dimension	Statement	Level of competence
1. Data Collection	1.1 Obtain, access and gather the appropriate data and/or data sources	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	1.2 Apply data limitations and quality measures (e.g., validity, reliability, biases in the data, difficulty in collection, accuracy, completeness)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
2. Data Management	2.1 Apply data processing and handling methods (i.e., methods for cleaning and changing data to make it more organized – e.g., duplication, data structuring)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	2.2 Apply data description (i.e., metadata)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	2.3 Apply data curation processes (i.e., to ensure that data is reliably retrievable for future reuse, and to determine what data is worth saving and for how long)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	2.4 Apply the technologies to preserve data (i.e., store, persist, maintain, backup data), e.g., storage	○ Novice ○ Advanced beginner ○ Competent

	mediums/services, tools, mechanisms	○ Proficient ○ Expert
3. Data Analysis	3.1 Apply data analysis and modelling methods (e.g. application of descriptive statistics, exploratory data analysis, data mining).	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	3.2 Apply data presentation methods (e.g., pictorial visualisation of the data by using graphs, charts, maps and other data forms like textual or tabular representations)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
4. Data Comprehension & Interpretation	4.1 Interpret data properties (e.g., measurement error, outliers, discrepancies within data, key take-away points, data dependencies)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	4.2 Interpret statistics commonly used with educational data (e.g., randomness, central tendencies, mean, standard deviation, significance)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	4.3 Interpret insights from data analysis (e.g., explanations of patterns, identification of hypotheses, connection of multiple observations, underlying trends)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	4.4 Elicit potential implications/links of the data analysis insights to instruction	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
5. Data Application	5.1 Use data analysis results to make decisions to revise instruction	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	5.2 Evaluate the data-driven revision of instruction	○ Novice ○ Advanced beginner ○ Competent ○ Proficient

		○ Expert
6. Data Ethics	6.1 Use the informed consent	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	6.2 Protect individuals' data privacy, confidentiality, integrity and security	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	6.3 Apply authorship, ownership, data access (governance), re-negotiation and data-sharing	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert

5. Thank you for your participation

Instructions to unlock the L2A MOOC content

Thank you for your participation.

Submit the form and get access to the Learn2Analyze MOOC.

Please provide your email address to receive an email with the Learn2Analyze MOOC Unlock Code.

After the course opening (1st of March 2021), you can return to the Learn2Analyze MOOC (https://learn2analyze.imc-learning.de) and use this code as a key to unlock the Learn2Analyze MOOC content.

What is your Email address?

Enter the email address you used when you made your OpenCourseWorld account.

_____

Appendix A.4: Learn2Analyze MOOC Post-course survey Consent Form

Learn2Analyze MOOC Post-course survey Consent Form

You are invited to participate in this survey because you have registered for the online course administered by Learn2Analyze Consortium. Your responses to this survey will help us to evaluate the Learn2Analyze MOOC and improve it in future versions.

The Post-Course Survey is expected to take approximately 30 minutes to complete and it is a requirement for the Certificate of Achievement.

In the Post-Course Survey you will be asked questions about your level of satisfaction and learning experience per module, as well as the overall learning experience of the Learn2Analyze (L2A) MOOC. Furthermore, you will be requested to answer questions about your overall gamification experience and the experience per gamification element. Finally, you will report on your achieved competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework, after attending the Learn2Analyze (L2A) MOOC.

Submit the form and get the key to unlock the Level A and/or Level B Learn2Analyze Certificate of Achievement. Return to the https://learn2analyze.imc-learning.de platform and use this key to download your certificate.

We greatly appreciate your willingness to share your time by participating. Your responses to this survey will help us to improve the quality of the learning experience and to better our course offerings, acknowledging your insights will prove invaluable.

Consent form to Participate in Web-based Survey

Title of Survey: Learn2Analyze MOOC Post-course survey Questionnaire

You are invited to participate in this survey because you have registered for an online course administered by Learn2Analyze Consortium. Your responses to this survey will help us to evaluate the **Learn2Analyze MOOC** and improve it in future versions. You will be asked to provide answers to a series of questions related to your learning experience and your competence level per Educational Data Literacy (EDL) Competence Profile (CP) Statement of the Learn2Analyze EDL Competence framework, after attending the course.

Purpose and Procedure:
The Learn2Analyze (L2A) is an Academia-Industry Knowledge Alliance for enhancing Online Training Professionals' (Instructional Designers and e-Trainers) Competences in Educational Data Analytics. L2A is an action co-funded by the European Commission through the Erasmus+ Program of the European Union (Cooperation for innovation and the exchange of good practices - Knowledge Alliances, Agreement n. 2017-2733 / 001-001, Project No 588067-EPP-1-2017-1-EL-EPPKA2-KA).

More information about the project is available at www.learn2analyze.eu.

Please note:

1. The survey will be carried out from 01/03/2021 to 06/06/2021.
2. Before you proceed to the survey questions, you will be asked to indicate your consent.
3. Should you decide you do not wish to further participate, you may leave the survey at any time, just by exiting your browser.
4. The questionnaire consists of 8 sections and needs approximately 30 minutes to be completed.
5. In the first section, you are invited to participate in the post-course survey.
6. The second section includes the consent form for participating in the survey.
7. The third section includes a set of questions on your level of satisfaction and learning experience per module of the Learn2Analyze (L2A) MOOC.
8. The fourth section includes a set of questions on your overall level of satisfaction and learning experience after attending the Learn2Analyze (L2A) MOOC.
9. The fifth section includes a set of questions on your overall gamification experience after attending the Learn2Analyze (L2A) MOOC.
10. The sixth section includes a set of questions on your experience per every implemented gamification element after attending the Learn2Analyze (L2A) MOOC.
10. The seventh section includes a set of questions on your competence level per "Educational Data Literacy (EDL) Competence Profile (CP) Statement" for each competence dimension of the Learn2Analyze EDL Competence framework, after attending the Learn2Analyze (L2A) MOOC.
11. In the final section, you will be asked for your name and email address in order to receive a key to unlock the Learn2Analyze Certificate of Achievement. Return to the https://learn2analyze.imc-learning.de platform and use this key to download your Level A and/or Level B Certificate.

Legal basis for processing the personal and sensitive data:

Personal Data:

In connection with this research, the Learn2Analyze Consortium's collection and processing of the following Personal Data is lawful based on consent (Article 6.1(a), GDPR):

□ Name, Email Address

□ Education Information

Sensitive Data:

In connection with this research, the Learn2Analyze Consortium's collection and processing of the following Sensitive Data is lawful based on consent (Article 9.2(a), GDPR):

□ Gender

Potential Benefits:

There are no direct benefits for participating in the survey. The survey results will help us evaluate the L2A MOOC and improve its future versions.

Potential Risk or Discomforts:

We do not perceive of any risk or discomfort in the completion of the survey.

Storage of Data:

The survey is completed in a Google Docs form and stored in a secure Google Drive folder under the e-mail l2a.r12.survey@gmail.com, for the time required by the purposes described in this document, for maximum 5 years.

Data transfer outside the European Union:
We may share some of the data collected with services located outside the European Union, in particular through the aforementioned Google services.

Right to Withdraw:
Your participation in this survey is voluntary. You are under no obligation to complete the survey and you can withdraw from the survey prior to submitting it. If you do not want to participate simply stop participating or close the browser window. You can simply exit the Web Browser without saving your responses, and they will not be recorded.

Rights of research participants:
You have the right to request access to, a copy of, rectification, restriction in the use of, or erasure of your information in accordance with all applicable laws, contacting the lead Learn2Analyze researcher for this survey in l2a.r12.survey@gmail.com. The erasure of your information shall be subject to the Learn2Analyze Consortium's need to retain certain information pursuant to any other identified lawful basis.

If the Learn2Analyze Consortium's use of your information is pursuant to your consent, you have the right to withdraw consent without affecting the lawfulness of the Learn2Analyze Consortium's use of the information prior to receipt of your request.

If you think your data protection rights have been breached, you have the right to lodge a complaint with your national Data Protection Authority (DPA).

Participant Concerns and Reporting:
If you have any questions concerning the survey or experience any discomfort related to the survey, please contact the lead Learn2Analyze researcher for this survey in l2a.r12.survey@gmail.com

Conflict of Interest:
We do not perceive any conflicts of interest in the development of this survey.

Compensation:
There is no compensation for participants in this survey.

Confidentiality:
The only people processing your input will be the researcher(s) involved in the Learn2Analyze project. The researcher(s) undertake to keep any information provided herein confidential, not to let it out of our possession and to report on the findings from the perspective of the entire participating group and not from the perspective of an individual. Please note that confidentiality cannot be guaranteed while data are in transit over the Internet.

How will results be used:

The results of the survey will be used for evaluating the L2A MOOC. The results from the survey may be used for research study, for scholarly purposes only and might be presented in conferences, published in journals or articles for educational purposes.
By indicating consent to participate in this survey you also indicate consent for the possible secondary use of this data at a later date if we decide to undertake a further longitudinal study for the enhancement of the Learn2Analyze MOOC.

Debriefing and Dissemination of Results:
The final report will be made publicly available through the official website of the project www.learn2analyze.eu.
On behalf of the Learn2Analyze Consortium, we would like to sincerely thank you for your participation in our survey acknowledging that your insights on the questions in this survey will prove invaluable.

Selecting "I Agree" below indicates that:
You have read the above information;
You voluntarily agree to participate in this survey;
You understand the procedures described above;
You give consent for the use of your Personal Data for the purposes outlined in this notice;
You give consent for the use of your Sensitive Data for the purposes outlined in this notice;
You are at least 18 years of age.

Do you consent? *

● I AGREE

Appendix A.5: Post-course Survey Questionnaire

To create your unique code ID please use:
1. The first letter of your first name (e.g. U)
2. The last 2 digits of your cell phone (if none use 00) (e.g. 17)
3. Your month of birth (e.g. 03)
4. The first letter of your middle name (if none, use X) (e.g. M)
5. The first letter of city/town you were born in (e.g. V)

(The above example would generate the unique code ID: U1703MV)

Please provide your unique code ID as per instructions:

_____

1. Learning experience per module

Number of questions in current section: 13

Please rate [1..5] your agreement to the following statements:

Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

Q1*. Learning objectives per module were clearly stated. *[1], [5], [7]*

MODULES	Strongly Disagree 1	2	3	4	Strongly Agree 5
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q2*. The content per module was presented in a comprehensible manner. *[2], [3], [5], [10]*

MODULES	Strongly	2	3	4	Strongly

	Disagree				Agree
	1				5
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q3. The educational materials and content per module were relevant and addressed the topic identified in the title. *[1], [2], [10]*

	Strongly Disagree				Strongly Agree
MODULES	**1**	**2**	**3**	**4**	**5**
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q4*. The educational materials and content per module were based on current up-to-date information. *[1], [2], [10]*

	Strongly Disagree				Strongly Agree
MODULES	**1**	**2**	**3**	**4**	**5**
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o

Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q5*. The instructional videos per module supported my learning and added value to the course content. *[2], [5], [6]*

	Strongly Disagree				**Strongly Agree**
MODULES	**1**	**2**	**3**	**4**	**5**
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q6*. The graphics per module supported my learning and added value to the course content. *[2], [5], [6]*

	Strongly Disagree				**Strongly Agree**
MODULES	**1**	**2**	**3**	**4**	**5**
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o

Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q7*. There was a good variety of content types (i.e., written notes, videos, graphics, etc.). *[2]*

MODULES	Strongly Disagree 1	2	3	4	Strongly Agree 5
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q8*. Further Readings per module were relevant and supported my learning. *[1], [2], [5], [6]*

MODULES	Strongly Disagree 1	2	3	4	Strongly Agree 5
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q9*. Learning activities (Polls, Discussions and Workshops) used in the module were effective and helped me construct explanations/solutions. *[2], [3], [8], [9]*

MODULES	Strongly Disagree 1	2	3	4	Strongly Agree 5
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q10*. Assessment tasks used per module challenged my thinking and supported my learning. *[5]*

MODULES	Strongly Disagree 1	2	3	4	Strongly Agree 5
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q11*. The assessment tasks (quiz learning activities) per module were relevant to the learning objectives. *[1], [2], [6]*

MODULES	Strongly Disagree 1	2	3	4	Strongly Agree 5

Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q12*. How many hours per week did you spend on each module? *[8]*

MODULES	< 3h	3 - 4h	5 - 6h	7 - 8h	> 8h
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o	o
Module 3 Learning Analytics	o	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o	o
Module 7 Applying Teaching & Learning Analytics with IMC Learning Suite	o	o	o	o	o

Q13*. How many posts did you contribute to discussion forums per module? *[7]*

MODULES	none	1 – 2 posts	3 – 4 posts	> 5 posts
Module 2 Online and Blended Teaching and Learning supported by Educational Data	o	o	o	o
Module 3 Learning Analytics	o	o	o	o
Module 4 Teaching Analytics	o	o	o	o
Module 5 Applying Teaching & Learning Analytics with Moodle	o	o	o	o
Module 6 Applying Teaching & Learning Analytics with eXact Suite	o	o	o	o

o o o o

2. Overall learning experience

Number of questions in current section: 25

Please rate [1..5] your agreement to the following statements:
Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

Q14*. The MOOC platform was easy to use. *[5]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q15*. The overall visual design of the MOOC was appealing. *[1]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q16*. The MOOC environment was well structured, topics and subtopics were logically arranged in a predictable pattern. *[1], [5], [10]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q17*. The learning path was easy to navigate. *[2]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q18*. MOOC objectives and learning goals were clearly stated. *[1], [5], [7]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q19*. The workload was reasonably spread. *[5]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q20*. The workload was in line with my expectations. *[2], [6], [8]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q21*. The MOOC difficulty was in line with my expectations at the start of the MOOC. *[2], [6]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q22*. The difficulty level of assessment tasks (quiz learning activities) was appropriate for the MOOC. *[1], [2]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q23*. The level of interaction with peer learners was adequate. *[5]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q24*. The discussion forums were an effective tool for collaborating with other learners. *[2], [9]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q25*. Final Assessment for the Level A Certificate required the learner to have acquired a basic set of competences for EDL.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q26*. The difficulty level of assessments was appropriate for the Level A Certificate.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q27*. Assessment for the Level B Certificate required demonstration of a higher expertise in EDL.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q28*. Assessment for the Level B Certificate included hands-on assignments based on simulated practice scenarios.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q29*. The difficulty level of assessments was appropriate for the Level B Certificate.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q30*. Help and support provided on the MOOC platform were adequate. *[5]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q31*. I can apply the knowledge created in this MOOC to my work or other related activities. *[8]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q32*. I was motivated to work through the MOOC. *[5]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q33*. I feel like I achieved my personal goals for this MOOC. *[3], [5], [6]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q34*. I enjoyed the MOOC. *[5], [9]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q35*. It is very likely to revisit the MOOC materials in the future. *[6]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q36*. It is very likely to recommend this MOOC e.g. to a colleague or friend. *[6]*

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q37*. What did you enjoy most about your MOOC experience? *[7], [8]*

Q38*. What did you like least about taking part in the MOOC? *[7], [8]*

---

3. Overall Gamification Experience

Number of questions in current section: 4

Please rate [1..5] your agreement to the following statements:
Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

1. Satisfaction, Enjoyment and Motivation of Gamification Experience

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1.1 I found the experience of the course enjoyable. *[16], [22]*					
1.2 I found the course stimulating. *[12]*					
1.3 I enjoyed the gamified elements in the course so much that I was motivated to be retained. *[18]*					
1.4 I found the experience of the course interesting. *[16], [22]*					
1.5 My interest on EDL has increased during the course. *[12]*					
1.6 It was a pleasure to work through such well-designed gamified course. *[18]*					
1.7 Gamification elements encouraged me to participate in the course. *[12]*					
1.8 I feel competent on EDL after completing the course. *[15], [20]*					
1.9 The course provided me with					

interesting options and choices. *[15], [20]*					
1.10 I feel very capable and effective on EDL after completing the course. *[15], [20]*					
1.11 I experienced a high level of freedom in the course. *[15], [20]*					
1.12 My ability to be retain in the course is well matched with the course's challenges. *[15], [20]*					
1.13 The course allows me to do useful activities related to EDL practice. *[15], [20]*					

2. During the course, the gamification elements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
2.1 Made me feel that success comes through accomplishments. *[17]*					
2.2 Made me feel like someone is keeping me on track. *[17]*					
2.3 Gave me the feeling that I was not on my own. *[17]*					
2.4 Made me feel guided. *[17]*					
2.5 Gave me a sense of knowing what I needed to do to do better. *[17]*					
2.6 Gave me a sense of having someone to share my endeavors with. *[17]*					
2.7 Gave me the feeling that I need to reach goals. [17]					
2.8 Gave me a sense of being noticed for what I have achieved. *[17]*					
2.9 Felt like participating in a competition. *[17]*					
2.10 Pressured me in a positive way by its high demands. *[17]*					
2.11 Made me want to be in first place. *[17]*					
2.12 Challenged me. *[17]*					
2.13 Made me feel that I needed to be on top to succeed. *[17]*					

2.14 Motivated me to do things that felt highly demanding. *[17]*					

3. During the course I felt that:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
3.1 Using gamification elements helped me to improve my performance. *[13]*					
3.2 Using gamification elements helped me to increase my productivity. *[13]*					
3.3 Using gamification elements made me feel more effective reaching learning goals. *[13]*					
3.4 Having gamification elements was useful. *[13]*					

4. My attitude towards gamification is favorable. *[14]*, *[19]*
   On a scale from 1 (not at all true) to 5 (very true)

4. Gamification Experience per Element

Number of questions in current section: 5

Please rate [1..5] your agreement to the following statements:
Strongly Disagree, Disagree, Neither Agree nor Disagree, Agree, Strongly Agree

1. How would you describe your experience with the gamification element "Points"?
2. How would you describe your experience with the gamification element "Badges"?
3. How would you describe your experience with the gamification element "Levels"?
4. How would you describe your experience with the gamification element "Progress Bar"?
5. How would you describe your experience with the gamification element "Leaderboard"?

for question 1 to 5	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I found it enjoyable. *[16]*, *[22]*					
I found it motivating. *[12]*					
It made me feel competent on EDL. *[15]*					
It made me to participate and work in the course. *[12]*					
It made me feel that my ability to be					

retain in the course was well matched with the course's challenges. *[15], [20]*					
It helped me feel very capable and effective on EDL. *[15], [20]*					
It made it easier for me to set clear goals. *[17]*					
It made me feel guided. *[17]*					
It helped me to improve my performance. *[13]*					
Having it in the course was useful. *[13]*					

5. Achieved Competence Level per L2A EDL-CP Statement:

Please rate your achieved competence level for each statement of the L2A Educational Data Literacy Competence Dimensions after attending this course. *[4]*

You can find additional information about L2A EDL-CP in http://www.learn2analyze.eu/

Dimension	Statement	Level of competence
1. Data Collection	1.1 Obtain, access and gather the appropriate data and/or data sources	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	1.2 Apply data limitations and quality measures (e.g., validity, reliability, biases in the data, difficulty in collection, accuracy, completeness)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
2. Data Management	2.1 Apply data processing and handling methods (i.e., methods for cleaning and changing data to make it more organized – e.g., duplication, data structuring)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	2.2 Apply data description (i.e., metadata)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert

	2.3 Apply data curation processes (i.e., to ensure that data is reliably retrievable for future reuse, and to determine what data is worth saving and for how long)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	2.4 Apply the technologies to preserve data (i.e., store, persist, maintain, backup data), e.g., storage mediums/services, tools, mechanisms	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
3. Data Analysis	3.1 Apply data analysis and modelling methods (e.g. application of descriptive statistics, exploratory data analysis, data mining).	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	3.2 Apply data presentation methods (e.g., pictorial visualisation of the data by using graphs, charts, maps and other data forms like textual or tabular representations)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
4. Data Comprehension & Interpretation	4.1 Interpret data properties (e.g., measurement error, outliers, discrepancies within data, key take-away points, data dependencies)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	4.2 Interpret statistics commonly used with educational data (e.g., randomness, central tendencies, mean, standard deviation, significance)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	4.3 Interpret insights from data analysis (e.g., explanations of patterns, identification of hypotheses, connection of multiple observations, underlying trends)	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	4.4 Elicit potential implications/links of the data analysis insights to instruction	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
5. Data Application	5.1 Use data analysis results to make decisions to revise instruction	○ Novice ○ Advanced beginner

		○ Competent ○ Proficient ○ Expert
	5.2 Evaluate the data-driven revision of instruction	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
6. Data Ethics	6.1 Use the informed consent	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	6.2 Protect individuals' data privacy, confidentiality, integrity and security	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert
	6.3 Apply authorship, ownership, data access (governance), re-negotiation and data-sharing	○ Novice ○ Advanced beginner ○ Competent ○ Proficient ○ Expert

6. Certificate

Congratulations, you have reached the end of our trip. You have successfully completed the L2A MOOC and submitted the Pre- and Post-Course Surveys. Thank you for your participation.

Please provide your name, surname and email address in order to receive a personalized Certificate of Achievement of the Learn2Analyze MOOC. Submit the form and get the key to unlocking the Learn2Analyze Certificate of Achievement. Return to the https://learn2analyze.imc-learning.de platform and use this key to download your Level A and/or Level B Certificate.

What is your email address?

_____

Name

_____

Surname

_____

NOTES

Appendix A.3: Pre-course Survey Questionnaire

[1] Cleveland-Innes, M., Ostashewki, N., Wilton, D. & Murphy, J. (2017). *Report of the Massive Open Online Course on Introduction to Technology-Enabled Learning (TEL MOOC).* Commonwealth of Learning, Athabasca University.

[2] Dillahunt, T., Wang, Z., & Teasley, S. (2014). Democratizing Higher Education: Exploring MOOC Use Among Those Who Cannot Afford a Formal Education. I*nternational Review of Research in Open and Distance Learning, 15*(5). doi: 10.19173/irrodl.v15i5.1841

[3] Dreyfus, S. E. (2004). The Five-Stage Model of Adult Skill Acquisition. *Bulletin of Science, Technology & Society, 24*(3), 177-181 doi: 10.1177/0270467604264992

[4] Duckworth, A. L., & Quinn, P. D. (2009). Development and Validation of the Short Grit Scale (Grit–S). *Journal of Personality Assessment, 91*(2), 166-174. Retrieved from https://globaled.gse.harvard.edu/files/geii/files/validation_grit_scale_duckworth_jpa_m._figueroa-2.pdf

[5] Egloffstein, M., Ebner, B., & Ifenthaler, D. (2019). Digital Learning from scratch: Initiating MOOCs within a Business School. *Proceedings of EMOOCs 2019, 2356*, 121-127.

[6] Egloffstein, M., & Schwerer, F. (2019). Participation and Achievement in Enterprise MOOCs for Professional Development: Initial Findings from the openSAP University. In D. Sampson et al. (Eds.), *Learning Technologies for Transforming Large-Scale Teaching, Learning, and Assessment* (pp. 91-103). Cham: Springer.

[7] Haggard, S. (2013). *The Maturing of the MOOC.* London: Department for Business, Innovation and Skills.

[8] Hennis, T., Topolovec, S., Poquet, O., & De Vries, P. (2016). Who is the Learner: Profiling the Engineering MOOC Student. *SEFI 44th Annual Conference*. At Tampere, Finland.

[9] Learn 2 Analyze (2019, February 25). Result 3: Report on the emerging competences for Instructional Designers and e-Trainers (expert-based survey).

[10] Li, K., Moore, D. R. (2018). Motivating Students in Massive Open Online Courses (MOOCs) Using the Attention, Relevance, Confidence, Satisfaction (ARCS) Model. *Journal of Formative Design in Learning, 2*(2), 102-113. doi: 10.1007/s41686-018-0021-9

[11] MichiganX: PLAx.(2016, Aug 1). Practical Learning Analytics. Survey. Retrieved from https://umich.qualtrics.com/jfe/form/SV_735AxMay2FSApSZ?redirect=SV_9ukuaMa1VKYV9C5&edx_user_id=1106c064f37e167af204554e4f14d74a&platform_id=edx&course_id=PLAx&Q_JFE=qdg

[12] PennX: BDE1x. (2018, June 12). Big Data and Education. Early-Course Survey. Retrieved from https://tccolumbia.qualtrics.com/jfe/form/SV_4YZSI2pgcXbQVNP?uid=81ac34046e912ca8860b8edd6318d8e8

[13] Perris, K. (2015). *Massive Open Online Course (MOOC) on MOOCs: Course Evaluation.* Commonwealth of Learning.

Phase B Additional Questions

[14] Martí-Parreño, J., Seguí-Mas, D., & Seguí-Mas, E. (2016). Teachers' Attitude towards and Actual Use of Gamification. *Procedia - Social and Behavioral Sciences*, *228*(June), 682–688. https://doi.org/10.1016/j.sbspro.2016.07.104

[15] Tondello, G. F., Wehbe, R. R., Diamond, L., Busch, M., Marczewski, A., & Nacke, L. E. (2016). The gamification user types Hexad scale. *CHI PLAY 2016 - Proceedings of the 2016 Annual Symposium on Computer-Human Interaction in Play*, 229–243. https://doi.org/10.1145/2967934.2968082

Appendix A.5: Post-course Survey Questionnaire

[1] 15-point Post-Course Evaluation Checklist for eLearning Developers. (2017, March 24). Retrieved from https://www.efrontlearning.com/blog/2015/07/15-point-post-course-evaluation-checklist-for-elearning-developers.html

[2] 60 Questions to Ask in a Post-training Evaluation Survey. (2019, May 27). Retrieved from https://www.talentlms.com/blog/questions-post-training-evaluation-survey/

[3] Creating a Course Evaluation Survey that Captures Informative Student Feedback. (2018, March 01). Retrieved from https://www.formstack.com/blog/2018/course-evaluation-survey/

[4] Dreyfus, S. E. (2004). The Five-Stage Model of Adult Skill Acquisition. Bulletin of Science, Technology & Society, 24(3), 177-181 doi: 10.1177/0270467604264992

[5] Egloffstein, M., Ebner, B., & Ifenthaler, D. (2019). Digital Learning from scratch: Initiating MOOCs within a Business School. *Proceedings of EMOOCs 2019, 2356*, 121-127.

[6] MichiganX: PLAx. (2016, August 1). Practical Learning Analytics. Post-course survey. Retrieved from https://umich.qualtrics.com/jfe/form/SV_735AxMay2FSApSZ?redirect=SV_9ukuaMa1VKYV9C5&edx_user_id=1106c064f37e167af204554e4f14d74a&platform_id=edx&course_id=PLAx&Q_JFE=qdg

[7] OT12 MOOC - Evaluation. (n.d.). Retrieved from https://www.surveymonkey.com/r/Z6RMVQN

[8] PennX: BDE1x. (2018, June 12). Big Data and Education. Course Exit Survey. Retrieved from https://tccolumbia.qualtrics.com/jfe/form/SV_4YZSI2pgcXbQVNP?uid=1106c064f37e167af204554e4f14d74a

[9] Perris, K. (2015). Massive Open Online Course (MOOC) on MOOCs: Course Evaluation. *Commonwealth of Learning.*

[10] Taylor-Powell, E., & Renner, M. (2009). Collecting Evaluation Data: End-of-Session Questionnaires. *Program Development and Evaluation.* University of Wisconsin-Extension.

Phase B Additional Questions

[11] Aparicio, M., Oliveira, T., Bacao, F., & Painho, M. (2019). Gamification: A key determinant of massive open online course (MOOC) success. *Information and Management*, *56*(1), 39–54. https://doi.org/10.1016/j.im.2018.06.003

[12] Borras-Gene, O., Martiñez-nunez, M., & Fidalgo-Blanco, Á. (2016). New Challenges for the motivation and learning in engineering education using gamification in MOOC. *International Journal of Engineering Education*, *32*(1), 501–512.

[13] Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly: Management Information Systems*. https://doi.org/10.2307/249008

[14] Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, *35*(8), 982–1003. https://doi.org/10.1287/mnsc.35.8.982

[15] Johnson, D., Gardner, M. J., & Perry, R. (2018). Validation of two game experience scales: The Player Experience of Need Satisfaction (PENS) and Game Experience Questionnaire (GEQ). *International Journal of Human Computer Studies*, *118*(February), 38–46. https://doi.org/10.1016/j.ijhcs.2018.05.003

[16] Hamari, J., & Koivisto, J. (2015). Why do people use gamification services? *International Journal of Information Management*, *35*(4), 419–431. https://doi.org/10.1016/j.ijinfomgt.2015.04.006

[17] Högberg, J., Hamari, J., & Wästlund, E. (2019). Gameful Experience Questionnaire (GAMEFULQUEST): an instrument for measuring the perceived gamefulness of system use. In *User Modeling and User-Adapted Interaction* (Vol. 29, Issue 3). Springer Netherlands. https://doi.org/10.1007/s11257-019-09223-w

[18] Loorbach, N., Peters, O., Karreman, J., & Steehouder, M. (2015). Validation of the Instructional Materials Motivation Survey (IMMS) in a self-directed instructional setting aimed at working with technology. *British Journal of Educational Technology*, *46*(1), 204–218. https://doi.org/10.1111/bjet.12138

[19] Martí-Parreño, J., Seguí-Mas, D., & Seguí-Mas, E. (2016). Teachers' Attitude towards and Actual Use of Gamification. *Procedia - Social and Behavioral Sciences*, *228*(June), 682–688. https://doi.org/10.1016/j.sbspro.2016.07.104

[20] Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, *30*(4), 347–363. https://doi.org/10.1007/s11031-006-9051-8

[21] Urbach, N., Smolnik, S., & Riempp, G. (2010). An empirical investigation of employee portal success. *Journal of Strategic Information Systems*, *19*(3), 184–206. https://doi.org/10.1016/j.jsis.2010.06.002

[22] Van Der Heijden, H. (2004). Van der Heijden/Hedonic Information Systems In researce User Acceptance of Hedonic information systems. *Source: MIS Quarterly*, *28*(4), 695–704.