Prioritizing Learning Outcomes in Different Learning Design Contexts

Blaženka Divjak, Barbi Svetec
University of Zagreb
Faculty of Organization and Informatics
Pavlinska 2, 42000 Varaždin, Croatia
{blazenka.divjak, barbi.svetec}@foi.unizg.hr

Bart Rienties, Paul Astles, Catriona Matthews
The Open University
Walton Hall, Kents Hill, Milton Keynes MK7 6AA
{bart.rienties, paul.astles, catriona.matthews}@open.ac.uk

Alexander Tillmann, Michael Eichhorn, Julia Schmitt
Goethe University Frankfurt
Theodor-W.-Adorno-Platz 1, 60629 Frankfurt am Main, Germany
{tillmann, eichhorn, schmitt}@studiumdigitale.uni-frankfurt.de

Abstract*. To ensure constructive alignment and valid assessment within courses and study programs, it is essential to identify relevant learning outcomes (LOs). However, not all LOs are equally important, so it is valuable to prioritize the LOs based on criteria. This can be done using different, more or less complex methods, from an individual estimation to structured multi-criteria group decision-making. In this paper, we classify possible approaches to the prioritization of LOs, taking into consideration the complexity of different learning contexts and the influence of a learning program on a learning path. We use a research case study to illustrate the prioritization of LOs of a professional development course designed in an international context.*

Keywords. learning outcomes, weights of learning outcomes, learning design, learning analytics, group decision-making

1 Introduction

In the last twenty years, a range of learning design (LD) approaches and conceptualizations have been introduced across the globe (Drugova et al., 2024; Macfadyen et al., 2020; Mangaroska & Giannakos, 2019). While a lot of these LD conceptualizations and tools have been proposed and tested, very few of these approaches have been specifically developed with collaboration and co-creation in mind. Working together as educators (and perhaps students) on designing appropriate learning outcomes (LOs) and LDs is an essential element of modern and inclusive LD practices (Cumbo & Selwyn, 2022; Schmitz et al., 2022; Tsui et al., 2024).

Perhaps one notable exception of an LD approach that is collaborative-by-design is the OULDI model, which is primarily based upon designing distance learning materials together in so-called module teams at the Open University (Conole, 2013; Toetenel & Rienties, 2016). Another example of a collaborate approach is FoLA (Feedback-oriented Learning Designs and Analytics) (Schmitz et al., 2022). Initially developed as a board game, the tool, which is now available digitally (https://fola.digital), enables LDs to be developed collaboratively and synchronously. A special focus is placed on raising awareness of the possibilities of learning analytics and feedback in joint lesson planning.

With the advances of technology and being able to simultaneously edit LDs synchronously and asynchronously in state-of-the-art LD tools, some LD tools allow for a blurring of the boundaries of how to design courses together (Rienties et al., 2023). For example, the Balanced Design Planning (BDP) tool is specifically designed to allow for co-authoring and co-design of learning activities, including LOs (Divjak et al., 2022; Divjak, Rienties et al., 2023). Indeed, preliminary results of the BDP tool (Divjak et al., 2024; Divjak, Rienties et al., 2023; Rienties et al., 2023) seem to suggest that educators can effectively co-design and co-write LDs together beyond an individual course unit, an organization, or even across borders. In fact, initial evidence seems to suggest that co-creation of LD can lead to engaging and innovative LDs (Divjak, Rienties, et al., 2023). But above all, it is essential that LD is sound, which means that all the elements of LD are aligned with the intended LOs. Notably, the co-creation process should consider that not all LOs have equal relative importance, which needs to be reflected in the weights of LOs (prioritization).

While there is some preliminary evidence that both technically and organizationally educators are able to effectively (co)design together in collaborative LD tools like the BDP, to the best of our knowledge there are limited studies available on how educators across different disciplines, organizations, and/or even

countries come to a consensus in how to effectively co-design. Particularly, there is scarce research on approaches to the prioritization of LOs in different learning contexts. Therefore, we conducted research to investigate how educators from different disciplines, organizations, and countries can effectively reach consensus on how to prioritize LOs when collaboratively designing learning experiences using LD tools.

2 Background

To the best of our knowledge, the first research on the prioritization of LOs was done by Divjak et al. (2021). The approach was based on multi-criteria decision-making (DM), specifically the Analytic Hierarchy Process (AHP) (Saaty, 2008). The AHP was used to create a hierarchy of criteria related to the characteristics of LOs, particularly the following four criteria: the importance of a topic or a context for the future profession; the required level of the LO based on a chosen taxonomy; contribution to the development of the 21st-century generic skills, and the student workload needed to fulfill the LOs. The criteria were compared in pairs to determine their importance (weights). Based on the criteria, LOs were also pairwise compared, and the total LO priorities calculated. This was done in a group DM process, with decision-makers including course professors and teaching assistants, as well as a former student.

Another study (Divjak, Svetec et al., 2023), building on the approach explained above, developed a model to ensure the validity of assessment, based on constructive alignment with weighted LOs. The model used learning analytics to compare the planned weights of LOs with actual assessment (points) and students' results, as part of the quality assurance of teaching and learning, and the continuous improvement cycle. Furthermore, it is important to note that the prioritization of LOs should not be reflected only in summative, but also in formative assessment (Divjak et al., 2024). Appropriate prioritization of LOs is the basis for the development of sound LD, which is also fundamental for meaningful learning analytics, leading back to recommendations for further improvement of LD.

3 Methodology

3.1. Study Setting

This research has been conducted as part of the international Erasmus+ project *Innovating Learning Design in Higher Education* (iLed). The purpose of the project is to support digital readiness, resilience, and the capacity of higher education (HE) through meaningful engagement with LD. The project includes four universities from four European countries: Croatia (University of Zagreb, Faculty of Organization and Informatics and School of Medicine), Germany (Goethe University Frankfurt), Finland (University of Oulu), The United Kingdom (The Open University, London). The use and development of the Balanced Design Planning (BDP) LD tool has been central to the project. The tool was originally designed based on contemporary research findings and theories such as ABC LD from University College London and the Open University LD (Divjak et al., 2022). Foundational to the BDP tool are the weight and constructive alignment of LOs, which inform the development of learning-centred courses and learning experiences.

The project has been working towards the development of a massive open online course (MOOC). The aim of the MOOC is to create a supportive learning environment for educators within HE to enhance their competences for the development of meaningful LD based on innovative pedagogies. The MOOC can also be used by educators in K-12 and lifelong learning (LLL), to support their development. The LD of the MOOC is co-created by the project partners, based on teacher requirements collected via a survey and the lessons learnt from the earlier phases of the project. This includes previous research on user experiences with the BDP concept and tool (Divjak, Rienties et al., 2023), which showed that educators struggled with the formulation and especially prioritization of LOs, as well as constructive alignment. Moreover, the LD of the MOOC also takes into account the findings of the focus group research performed in the same project, to investigate the potential of innovative pedagogies to enhance contemporary LD.

The design of the MOOC is in the focus of this paper, as case study research in which we investigate group DM in an international context.

3.2. Classification of Approaches to Prioritization of Learning Outcomes

In this study, our aim was to look at the prioritization of LOs from the perspective of different contexts, taking into account the following criteria:

- **Influence of the course on learners' career: high-stake vs. low-stake.** For example, a learning program towards a formal degree (high-stake) vs. non-formal training (low-stake); an obligatory course (high-stake) vs. an elective course (low-stake).
- **Complexity of LOs and learning environment: high complexity vs. low complexity.** For example, higher levels of LOs (high complexity) vs. lower levels of LOs (low complexity); LOs of a study program and an obligatory course (high

complexity) vs. LOs of a smaller elective course or non-formal training (low complexity); institutional environment (low complexity) vs. international environment (high complexity).

The contexts also imply the diversity of decision-makers (in terms of their role, experience, number and influence) and a corresponding choice of DM methods (estimation, group DM, user requirements survey, multi-criteria DM, etc.).

These criteria are not independent of each other, but are mutually interrelated. From the perspective of these criteria, we can describe four fundamental approaches to DM in the prioritization of LOs (Fig. 1):

Complex approach. This approach includes *formal learning* (high-stake) and *complex LOs* (LOs of diverse levels, including higher levels). In line with that, it implies a *diverse decision-maker group*, as well as it requires more *structured and reliable DM methods*. An example is the above-mentioned study by Divjak et al. (2021). In the study, prioritization was done for high-level LOs (graduate study level) in a high-stake formal learning context (obligatory course). In a nutshell, a multi-criteria group DM method (AHP) was used to determine the weights of LOs.

Complicated approach. This approach includes *non-formal* or *a smaller/elective unit of formal learning* (low-stake) and *complex LOs* (LOs of diverse levels). It implies a *moderately diverse decision-maker group* and a combination of *different simpler DM approaches*. This approach was studied within this case study research done in an international context and is elaborated in the following sections.

Standard approach. This approach includes *formal learning* (high-stake) and *not-so-complex LOs* (no or not many high-level LOs, or a narrow range of levels). It implies *less diversity in terms decision-makers*, i.e. DM can be done by a few experts or even an individual expert. DM methods can include investigation of user requirements (standard for industry and professional training in general) or academic DM in a standard environment, based on a few criteria and therefore the use of simple DM methods (e.g., SWING - von Winterfeldt & Edwards, 1986).

Simple approach. This approach includes *non-formal learning* or *a smaller/elective unit of formal learning* (low-stake) and *not-so-complex LOs* (a few LOs/LOs of a similar level). It implies less diversity in terms of decision-makers, i.e. it is based on informed DM by individual decision-makers (e.g., a teacher, learning designer, curriculum developer) or a discussion of a smaller group of educators with similar expertise. The core of this approach is a direct estimation of weights or assigning equal weights to all LOs.

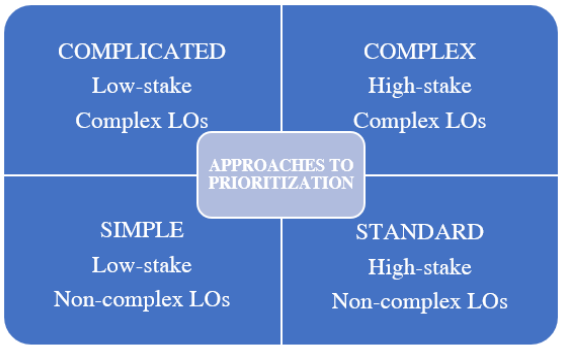

Figure 1. Approaches to prioritization of learning outcomes

This classification of approaches is inspired by the Cynefin framework (Snowden & Boone, 2007), which elaborated DM in four different domains: chaotic, complex, complicated and simple.

4 Case Study Research

We conducted case study research (Yin, 2017) which complements the existing research on LO prioritization conducted by Divjak et al. (2021) covering the *complex* approach, by providing additional insights in the *complicated* approach, as described in the Methodology section.

Our study was focused on the following research question: How to estimate the weights of LOs in a *complicated* international context?

The study was conducted as part of the above-mentioned Erasmus+ project, in relation to professional development (non-formal) activities of HE teachers. It was done in four phases, as follows.

4.1. First Phase: Focus Groups on Innovative Scenarios & Workshops

From July to October 2023, a total of 13 focus groups were conducted with 95 participants (63 female, 32 male) across the four institutions. The focus group participants were experienced university teachers, researchers, learning designers and student teachers. Each focus group followed the same five-step approach in the local language.

Prior to the focus group, all participants received an information package with descriptions of 11 authentic learning scenarios, a consent form and an information sheet. At least two scenarios were selected and discussed per HEI.

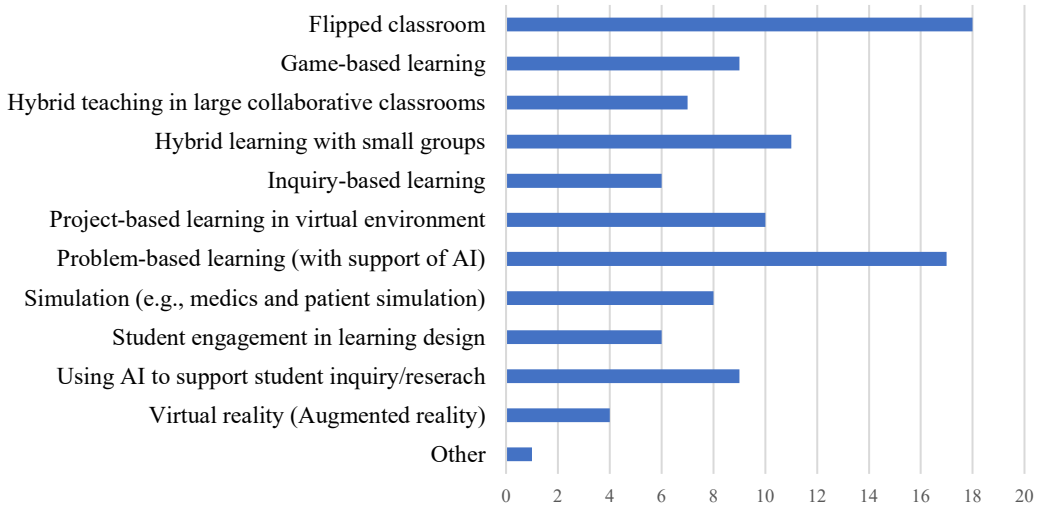

Figure 2. Rating of authentic learning scenarios

Based on the findings of the focus groups, a workshop was developed and implemented locally at four universities to support improvement of LD using the BDP concept and tool. The workshop LOs included understanding digital pedagogy, assessing competences, evaluating teaching and learning methods, analyzing courses, integrating digital pedagogy and using the BDP for course planning.

4.2. Second Phase: Survey on Teachers' Requirements & Estimation of Learning Outcome Weights

In the second phase, educators' perceptions of the importance of LOs were surveyed as part of a questionnaire covering their experiences with the workshops, as well as identifying educators' needs in terms of further training. Here we report on the results of the questionnaire in the part relevant for this study, namely, the questions referring to the sample, LO relevance, workload and innovative pedagogies.

This questionnaire was filled in by 25 participants from four HEIs (by the time of the paper submission, but data collection continues beyond this period). The majority of the participants were HE teachers (20), followed by researchers (12), learning designers (6), curriculum developers (4), educational decision-makers (3) and technical experts (1). Each participant was given the possibility to choose more than one role. The vast majority of the participants (80%) were female, and a half were mid-career experts (10 - 20 years of working experience in the respective area).

The questionnaire included a list of seven possible LOs as the basis for the project MOOC, as well as a possibility to propose additional LOs. The proposed LOs are presented in Table 1. The highest-rated LOs were those related to constructive alignment (72%), using design analytics (72%) and creating LD (64%).

The questionnaire also included a list of online or blended authentic learning scenarios, covered in the focus groups and workshops in the first phase, and subsequently in the proposed list of LOs. The participants chose the scenarios (one or more) most relevant for their (future) practice, which should be covered in the project MOOC. The highest-rated scenarios were flipped classroom and problem-based learning supported by AI, as shown in Fig. 2.

Table 1. Proposed learning outcomes for the MOOC

Learning outcome (LO)	Responses
Implement innovative pedagogies in HE teaching and learning (TL)	14 (56%)
Create LD of a course based on LOs	16 (64%)
Use design analytics to upgrade course(s)	18 (72%)
Meaningfully apply contemporary technologies and AI in TL	8 (32%)
Constructively align the elements of LD (LOs, TL activities, assessment, workload)	18 (72%)
Orchestrate learning design (developing content and LMS activities based on LD)	10 (40%)
Self-evaluate the implementation of own course(s)	10 (40%)
Other	1 (4%)

The participants reported on how many hours of training they would find beneficial to cover the proposed LOs, with their answers ranging from 10 to 60 hours, with the average of responses suggesting the workload of 1 ECTS. However, it should be noted that these answers were given by the participants who had already taken training in the first phase, and that for newcomers, the workload would have to be higher.

Table 2. Prioritization of learning outcomes

Learning outcomes (LO)	LO weight: initial proposal	LO weight: group DM average	SD	Difference	**LO weight: final version**
Implement innovative pedagogies in HE teaching and learning (TL)	18	18.08	3.26	-0.08	18
Create learning design of a course based on LOs and constructive alignment	32	27.69	5.82	4.31	30
Use learning analytics, especially design analytics, to upgrade course(s)	20	13.85	3.77	6.15	18
Meaningfully apply contemporary technologies and AI in TL	10	15.00	5.22	-5.00	12
Orchestrate learning design (developing content and LMS activities based on learning design)	10	13.46	6.08	-3.46	12
Self-evaluate the implementation of own course(s)	10	11.92	3.34	-1.92	10
Total	**100**	**100**			**100**

Based on the described results, the LOs were reformulated and the initial prioritization (weights) prepared by the first and second author. The reformulated LOs are presented in Table 2.

4.3. Third Phase: Group Decision-Making on Learning Outcome Weights

In the third phase, project experts from the four universities were presented with the proposed LOs for the MOOC and the corresponding (initial) weights, in a face-to-face project meeting. The proposed LOs for the MOOC were discussed and slightly modified. To widen the perspective and fine-tune the LO weights, group DM was done.

The group DM process included 13 project experts: HE teachers, researchers, PhD students, learning designers and technical experts. These experts were earlier engaged as trainers in the focus groups and workshops in the first phase, so they had the adequate background to estimate the importance of the proposed LOs. The experts were presented with two criteria, which they discussed and fine-tuned, and used in the process of prioritizing the agreed LOs, having in mind their insights from the focus groups and workshops:

- **Criterion 1:** Pre-knowledge and usefulness for the teaching practice
- **Criterion 2:** Workload needed to reach the desired level of LO.

4.4. Fourth Phase: Aggregation of Decision-Makers' Prioritization of Learning Outcomes

In the fourth phase, the group DM experts took a look at the results and discussed the differences and similarities, as presented in Table 2: between the initial proposal of the weights and the new average (Difference), and between individual DM experts' opinions (SD). In the discussion, the LO weights were further adjusted taking into account both the initial prioritization and the group DM. The final values are presented in Table 2.

5 Discussion

Prioritization of LOs is an important element of LD, with implications on the continuous improvement cycle of courses and study programs, as demonstrated in the study by Divjak, Svetec et al. (2023). Although valuable, it has been confirmed as challenging for educators (Divjak, Rienties et al., 2023).

To shed some more light and provide some practical guidance for educators, we classified four possible approaches to the prioritization of LOs, taking into consideration different learning contexts, with varying influence on learners' careers, and demanding to a varying extent. The classification relies on the principle of efficient use of resources (human, organizational), and therefore links DM methods and decision-maker involvement with learning contexts.

In this case study, we focused on describing a multi-stage *complicated* approach applied to the prioritization of LOs in the context of the design of a MOOC within an Erasmus+ project. The presented approach builds on the existing concepts of learner-oriented teaching and constructive alignment, integrating the perspectives of both learners and teachers. The results show that structured multi-stage prioritization of LOs, involving different stakeholder perspectives in an international context, is feasible in non-formal learning settings.

The results show that experts' opinions on LO weights were to a great extent aligned with the opinions of learners, however, with exceptions. Importantly, the use of learning analytics was considered more demanding by learners than by experts. Conversely, meaningfully applying contemporary technologies and AI in teaching and learning was considered more important by experts than by learners. (Table 2) Both might be related to the previous exposure, existing competences, and awareness of the capabilities, benefits and risks of the said tools (Rienties et al., 2023). Interestingly, both points of disagreement are related more to technology and algorithms, than pedagogy and LD.

In comparison with the *complex* approach used by Divjak et al. (2021), the *complicated* approach used within this case study is more suitable for this context, with a large group of international experts. Multi-criteria DM methods, like the AHP used in Divjak et al. (2021), are more complex and time-consuming, requiring several hours per expert to prepare and complete. Moreover, the AHP becomes almost impossible to manage with a large DM group or when there are many alternatives and criteria to consider.

We argue that the choice of appropriate methods for the prioritization of LOs strongly depends on the respective teaching-learning context. While more structured approaches like the AHP seem to be appropriate for formal, high-stake, *complex* settings, more intuitive methods may suffice for lower-stake situations. The presented approach demonstrates a promising way for holistic prioritization of LOs, involving various stakeholders. However, it is important to use the approach appropriate with respect to the context, not to burden practitioners in the preparation of LD.

The *complicated* approach used in this case study consisted of two stages: investigation of user requirements and simple group DM by experts. Each of these stages could be used as a stand-alone method within the *standard* approach, which is less demanding and time-consuming for practitioners. Additionally, another DM method suitable for this context can be the SWING method (von Winterfeldt & Edwards, 1986), in which LOs are first ranked, and the most important one given 100 points. After that, other LOs are compared with the most important one and assigned points.

In summary, the study shows that for high-stakes LOs, such as those of formal degree programs or certifications with major career implications, more time and human resources should be allocated to thoroughly prioritize the LOs. The prioritization process requires structured DM methods like AHP that allow for comprehensive analysis from multiple expert perspectives. In contrast, for a low-stake learning environment, such as non-formal professional development courses or personal development, less time is needed and more intuitive DM approaches to prioritization can be utilized. Larger studies on the prioritization of LOs in different contexts would be desirable as a future research perspective, to test the usability of the approaches and add to the toolbox of DM methods in different contexts. As regards LD concepts and tools (e.g. the BDP), guidelines and functionalities to support the prioritization of LOs would be valuable. Finally, more elaborated theoretical links of the presented approaches with the Cynefin framework can be investigated.

6 Conclusion

Learning outcomes (LOs) are a widely accepted instrument of ensuring learner-centred teaching and learning. Sound learning design relies on constructive alignment, which calls for meaningful prioritization of LOs, reflecting their relative importance. The prioritization of LOs can be done using four different approaches, depending on the complexity of LOs and the importance of a learning program for a learner's career. These approaches include *complex, complicated, standard* and *simple*. For each of these approaches, the prioritization of LOs can be modeled using different DM methods, from multi-criteria DM (e.g., the AHP) to a simple estimation of LO weights. In any approach, it is valuable to consider different perspectives, including teachers and learners. Finally, the complexity of the approach used to prioritize LOs should be aligned with the given teaching and learning contex.

Acknowledgments

This study has been conducted within the Erasmus+ project *Innovating Learning Design in Higher Education* (iLed) (2022-1-HR01-KA220-HED-000085818).

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