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Title **A three-step framework to develop the visual aspects of Learning Design**

Author **Peter Gundersen**
University College Absalon
Denmark

Bjarke Lindsø Andersen
University College Absalon
Denmark

Anne Kristine Petersen (Textmentor)
University College Absalon
Denmark

Abstract This article contributes to the ongoing efforts to use visualizations as a means to develop, communicate, and represent learning design. We introduce a novel visual framework for Learning Design, inspired by The Larnaca Declaration and visual theorist Johanna Drucker's insights. We propose a three-step approach for educators and educational researchers to effectively represent teaching and learning sequences. The article builds from a brief introduction to the field of Learning Design and especially the metaphor of musical notation, which in Learning Design literature has been used as a driver for understanding the ambitions of the approach. This introduction ties into current issues within the field of Design-Based Research concerning generalization, definitions of interventions and the iterative manner in which DBR projects ideally progress. Utilizing Drucker's visualization purposes and Jacques Ber-

tin's graphic variables, we explore how size, color, shape and texture can convey educational information, both qualitatively and quantitatively. Our analysis of existing learning designs illustrates the potential for increased rigor and readability when applying the framework. Furthermore, the article offers two re-interpretations of an existing learning design to provide a starting point for further exploration of meaningful and rigorous ways to communicate intended teaching and learning sequences and environments. This work pioneers the fusion of Drucker's theories with Learning Design, and offers an innovative, albeit tentative, methodology for educators and designers to visualize and disseminate educational strategies and ideas.

Keywords Learning Design
Visual theory
Design-Based research
Representation of teaching

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A three-step framework to develop the visual aspects of Learning Design

Peter Gundersen, Bjarke Lindsø Andersen

1.0 Introduction

In this paper, we further contribute to the ongoing refinement of a descriptive framework for representing teaching and learning activities (Conole, 2013; Dalziel, 2003; Laurillard, 2008; Mor & Craft, 2012). Our starting point is the Larnaca Declaration, which marked the early milestone of the research field Learning Design. We provide an overview of its overall purposes, cover the analogy of music notation and discuss the claims of Learning Design as a neutral framework for conveying educational ideas.

Our interest starts here as we claim that in the realm of Learning Design, the visual representation and communication of pedagogical concepts and instructional strategies constitute a pivotal yet underdeveloped aspect. Addressing this lacuna, we draw insights from visual theorist Johanna Drucker. Drucker, a distinguished scholar in the field of visual culture and communication, has made substantial contributions to the study and critique of visual forms, aesthetics, and semiotics (2014, 2020). Her expertise in analyzing and deconstructing various visual languages positions her as a valuable, and still to be explored resource in advancing the visual discourse within Learning Design. We propose a framework consisting of three steps to be used by fellow researchers and practitioners when attempting to represent their ideas of teaching and learning in illustrative ways.

In the final parts of the paper, we put the framework to use by providing examples of learning designs following the framework and remaking existing learning designs according to the guidelines.

2.0 Learning Design concepts and the need for a Learning Design Framework

For more than two decades, educational researchers have dedicated significant effort to developing the field of Learning Design, aiming to address the complexities inherent in educational practices (Conole, 2013; Dalziel, 2003; Laurillard, 2002, 2008, 2013; Mor & Craft, 2012; Maina, Craft & Mor, 2015; Pozzi, Persico & Earp, 2015). According to Conole (2013) and Dalziel et al. (2016), a fundamental principle underpinning the concept of Learning Design is to elucidate and make more shareable the processes involved in designing (for) learning, thus enabling informed pedagogical decisions regarding the creation of learning activities and the implementation of suitable resources and technologies.

Learning Design, in essence, does not align with traditional pedagogical theories, such as constructivism. Instead, it claims to represent a level of abstraction above these theories, aiming to construct a framework capable of encapsulating a diverse range of educational ideas:

"Learning Design can be viewed as a layer of abstraction above traditional pedagogical theories in that it is trying to develop a general descriptive framework that could describe many different types of teaching and learning activities (which themselves may have been based on different underlying pedagogical theories)."

(Dalziel et al., 2016, p. 9)

Koper (2001) has proposed to describe Learning Design as a pedagogical meta-model and it is stressed in the Larnaca declaration that the originators wish to steer away from the controversial use of pedagogically neutral and rather have Learning Design frameworks *"describe a broad range of teaching and learning activities"* (Dalziel et al., 2016, p. 9) in order to avoid visceral reactions from colleagues. The core concepts of Learning Design, guidance, representation and sharing, are captured in the Learning Design Conceptual Map (Figure 1) which also offers an overarching view of the educational landscape surrounding and influencing these concepts such as educational philosophy, learning environment and level of granularity.

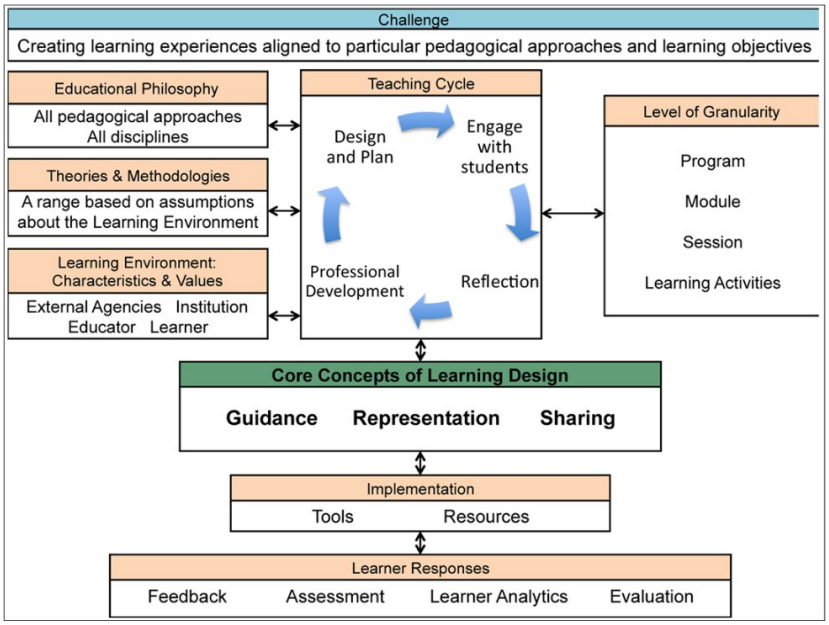

Figure 1. Learning design conceptual map (Dalziel et al., 2016, p.10)

In the map, the challenge of creating learning experiences aligned to particular pedagogical values and objectives are situated at the top and the implementation and learner responses at the end. Between this abstract map of key concepts and their relations with each other and the practice of applying Learning Design concepts to the creation and implementation of effective teaching and learning activities, the originators of the declaration underpin the need for a descriptive lan-

guage or a notational format for how to describe such activities in a meaningful and standardized way.

The aim of a Learning Design Framework is thus to provide a standardized notational system for educators to utilize in order to realize envisioned learning experiences while tailoring them to the specific needs, preferences, and dynamics of the learners within a given context.

In front of such a daunting task the authors offer a historic comparison to that of music notation, which in early days of adaptation in similar fashion to teaching and learning was deemed by some proponents to be too difficult to ever reduce to written form (Dalziel et al., 2016).

3.0 Learning Design and music notation

Drawing a comparison to music notation, the descriptive framework for teaching and learning activities does not attempt to encapsulate every detail of the learning process. Instead, it seeks to convey sufficient information to allow one educator to benefit from the insights and innovations of another educator. These educational concepts can be diverse, mirroring various musical styles stemming from different underlying pedagogical theories.

"By comparison with music notation, a descriptive framework for teaching and learning activities would not describe everything that occurs – rather, it would seek to convey enough information so that one educator could benefit from the great ideas of another educator. These educational ideas could be of many different kinds, based on different underlying pedagogical theories, in a manner similar to different styles of music."

(Dalziel et al., 2016, p. 2)

One of the advancements facilitated by Learning Design is the ambition to create a sequence of teaching and learning activities that remains independent of the implementation context. The aim is to enable seamless sharing between educators and applicability in different learner contexts (ibid.). However, asserting the applicability of learning designs across diverse contexts with a high level of neutrality is met with skepticism by Goodyear and Carvalho (2013). They contend that tasks and learning activities are transformed and adapted by teachers and students in their respective environments, emphasizing that the act of learning cannot be designed in a rigid, uniform manner. Designs, in their view, act as links in facilitating collaborations among teachers, offering a shared language for describing teaching methods and plans, while the actual design is inevitably shaped by individual teachers' interpretations, influenced by the culture of teaching planning.

In the educational field, akin to the interpretation and live performance of music by musicians, educators play a crucial role in adapting their teaching strategies to the unique needs of their learners. This adaptation could involve refining a teaching idea from a colleague, subsequently modifying it for future classes based on insights into learners' needs. It might also entail real-time adjustments within a class, responding to unexpected outcomes or interesting new ideas that emerge during the learning process. This live adaptation, as highlighted by Dalziel (2015), has not received adequate attention within Learning Design and has garnered a critical response from teachers who perceive a certain degree of agency as central to their self-identity as educators (Hanghøj et al., 2022). Similarly, it becomes essential to discern between an abstract learning design, representing a set of activities independent of a learner class, and a concrete learning design, which is implemented with a specific group of learners.

If we are to follow the reservations put forward against a universal language of Learning Design, should we then simply abandon the idea of representing teaching and learning sequences altogether? In our view, no. In our minds, a systematic way of visualizing learning designs not only help the learning designer or any practitioner attempting to preserve their ideas, but also confronts some of the main issues discussed in the current and broader fields of Design-Based Research and/or educational design research.

4.0 The implications of systematic visualizations of learning desings for Design-Based Research

The implications of the development of a systematic way of visualizing learning designs for DBR is threefold. Most importantly, it provides a visual language to help researchers and practitioners distinguish more easily between iterations of learning designs worthy of preservation. Following this, it addresses the difficulties design-based researchers face when reporting on the iterative manner in which DBR works. Secondly, it would mitigate the criticism raised about the absence or vagueness of what constitutes an intervention. Third and lastly, it aids to the ambition of generalizing proven teaching ideas to a broader audience. In the following, we briefly touch upon each of these issues.

In a dissertation specifically addressing design issues within DBR (Gundersen, 2021) the use and understandings of the key terms *intervention* and *iteration* in nearly eighty of the most cited DBR articles are analyzed. On iteration, the study concludes:

"...even though the notion of iteration is consistently put forward as a defining characteristic of how researchers within the field operate, it is not very prevalent across the selected studies. When dealt with, it is in many cases only used as a demarcation of the DBR position or as an indication of future research."

(Gundersen, 2021, p. 115)

This is not to say that researchers within DBR do not work in an iterative manner, rather it highlights the difficulties design-based researchers face when attempting to report such processes in academic journals. If researchers and practitioners within the field had a systematic way of capturing their ideas, these visualizations would prove useful when attempting to make the development of a design transparent to relevant peers.

In relation to interventions in DBR, Engeström (2008) most prominently has criticized design researchers for not specifying this crucial component of their analysis. In his view, the notion of dynamical learning environments for instance as proposed by Barab and Kirshner (2001) suffers from vagueness as a result of its overly complex reciprocal interaction between students, teachers, class assignments and resources that at the same time stabilize and destabilize the system. Zheng (2015) finds that there is trending tendency in reported DBR projects towards not providing the details of how interventions are revised. To this criticism we would add that the degree of disruption varies from minimal intervention strategies with little manipulation of experimental conditions to radical intervention strategies where researchers aim at individual and societal transformation as well as exposing existing inequities (for more on minimal and transformative interventions see Gundersen, 2021). Systematic visualizations of learning design could help mitigate some of the concerns raised and might help tighten the understandings internally among the DBR community of what constitutes an intervention and what does not.

Lastly, the challenge of generalization in DBR has been debated both internally and externally since its inception (see for instance Dede, 2005). The proposal often put forward in repository texts is mainly to refute or strengthen design principles. However, in practice, principles have proven extremely difficult for DBR researchers to work with (see Baumgartner & Bell, 2002; Bakker, 2019). Having an alternative to principles in the form of learning designs could be useful for spreading effective teaching strategies across educational domains.

Based on these potentials, we hold the position that even though we abandon the idea of creating a universal notational system applicable to all teaching and learning situations, there are still good reasons for representing the instructional and organizational parts of a learning design. The initial discussion on Learning Design provides us with a list of guidelines as to what such an approach should entail:

- Where in musical notation the parameters of representation are more or less fixed (*pitch* (interval and distance between notes), *duration* (rhythm and tempo) and *volume*), a learning design should represent a different selection of key parameters of a teaching sequence depending on the intention of the designer.
- The learning design must leave room for teacher agency as each group of learners, the learning environment and the

educational culture all influence how a learning design is to be carried out successfully in practice.

- In order to fulfill the purpose of shareability, a learning design must visually support an intuitive and consistent reading of it despite the fact that vastly varying key parameters exist.

Following this, we opt to abandon the pursuit of creating an overarching neutral visual notational system for all educational ideas and purposes. Instead, we argue that learning designs should aim at visualizing the key parameters of the intended design and that those visual cues should be restrained to a certain logic. We turn to Drucker and her work on visual communication to aid us in our efforts.

Literature searches reveal that the synthesis of Drucker and her work on *graphesis* and the field of Learning Design have not previously been published in any academic educational journal. What we suggest in the article is therefore the very first steps of trying to create a visual model to support the visualization of learning design that is still sensitive to the intended focal points of the designer, yet both intuitively readable and flexible for educators to use.

5.0 A framework for understanding the process of visualizing learning designs in three steps

To scaffold and guide development of visualization of learning design, we suggest drawing on the theoretical framework developed by Johanna Drucker, as she has made significant contributions to the field of visual forms of knowledge production in humanities (Drucker, 2014, 2020). In the following, we present a theoretical methodology for analyzing and developing coherent and rigorous visualizations of learning designs. It consists of three steps. Firstly, purposing, secondly parametrization and thirdly creating a visualization.

5.1 Step 1: Purposing

Drucker's primary focus lies in exploring how graphical forms can facilitate the production and dissemination of knowledge. Her work underscores the importance of visual interpretation in organizing, representing, and analyzing data. Through an examination of the history of graphic design and visual communication, Drucker offers a critical perspective on the visual rhetoric used to convey complex ideas and information. However, she does not specifically address educational contexts or learning designs. Thus, in the following, we present her six visualization formats, interpreting them specifically with reference to learning design and education, reframing them as different purposes of visualizations.
In her historical analysis, Drucker delineates six distinct visualization formats pertinent to the humanities. These formats emerged at specific historical junctures to address particular challenges, each serving a unique purpose. The first four formats primarily function to repre-

sent information, while the latter two serve as catalysts for generating new knowledge.

The first purpose is space-making. Space-making graphics fundamentally ask the question of 'where'. The most prominent historical example of space-making visualizations is the map, invented to support navigation, wayfinding, and property ownership. Space as an overarching parameter concerns the demarcation of territories and the different paths that connect them. Examples of relevant parameters serving the purpose of space-making in education include home, campus, or work. However, space-making is not limited to demarcating borders between physical territories but also concerns boundaries between immaterial areas. In education, such parameters may include curriculum topics, various digital platforms, learning environments, social and professional spaces, workshops, and classrooms, private/public, etc.

The second purpose is time-keeping, answering the question of 'when'. According to Drucker, visualizations of time-keeping are closely connected to the division of duration into mechanical time (seconds, hours, days, etc.), with timelines and calendars being the most prominent examples. Time-keeping in learning design and education concerns parameters such as repetition, periods, pace, sequence, duration, discontinuity, progression, beginnings, and ends.

The third purpose is record-keeping, concerning the question of 'what'. The grid was invented by the Sumers to visualize different kinds of organization. Groupings, tables, and charts are developments of these and have, particularly in statistics, probably been the most widespread format of visualizations. In education, relevant parameters of record-keeping are exhaustive. Guiding elements include sizes, groupings, proximity between topics, content or people, attendance, or learning approaches.

Fourthly, trees of knowledge, which are also concerned with the question of 'what'. "Trees of knowledge are graphical forms whose structure is static and fixed, but whose spatial relations carry meaning." (Drucker, 2014, p. 95). Knowledge trees are known from genealogy and the development of thematic classification of knowledge in encyclopedias. In education, this purpose is related to visualizations of progression, taxonomy, multi-direction, or curriculum.

The last two are not developed with the purpose of representation but rather as heuristics for the creation of new knowledge. We introduce them collectively, as they resemble each other. First are knowledge generators. They have been developed to support combinatorial calculation. The key idea is that they take a fixed set of values and allow them to be recombined. Thus, the process of combination and creation of new knowledge through relating existing values is a defining characteristic. A flow chart may be one such example, and historically, Ramon Llull's volvelles have been one of the prominent examples. Secondly, we have dynamic systems. They have, in contrast to knowledge generators, values that change as one interacts with the

visualization or it is played. Dynamic systems have evolved with the need for the visualization of forces, pressures, flows, etc. In education, relevant parameters related to knowledge generators and dynamic systems may be concept development, design processes, uncertainty, contingency, roles, and identity formation.

As evident from Drucker's analysis, visualizations can serve manifold purposes. However, the vocabulary provided by Drucker through her six distinct purposes contributes to a systematic language. As she states, "it is an outline of principles and precepts that structure visual forms of knowledge production and representation in graphic formats." (Drucker, 2014, p. 5). When visualizing a learning design, the first question to be answered is "what are the purposes?". Drucker provides a vocabulary for possible answers to this question.

5.2 Step 2: Parameterization

Once the purpose of a visualization has been determined, the next step is *parameterization*. In the realm of data analysis, the task of selecting key components for focus is fundamental, and this is termed parameterization. While this term may not be commonplace in discussions about learning design, it holds significant importance for visualization as it concerns answers to the fundamental questions of how, what, whom, and when in relation to learning and teaching. Specifically, when one is aiming to visually represent data, say in diagrams or graphs, parameterization assists in determining which elements of the data should be showcased. This is because visualizations that communicate ideas well should only have a selected number of parameters.

According to Ware (2019), these chosen components, or parameters, are instrumental in highlighting the principal ideas, relationships, or trends inherent in the data. As per Drucker (2020, p. 55), this can be seen as an exercise in identifying and presenting values deemed to be of paramount importance. In music notation it is pitch, tempo and so on. However, in learning and teaching there is no fixed list of agreed upon fundamental parameters. Consequently, when producing a visual representation, there is an implicit prioritization, which means that while some aspects of the learning design gain prominence, others might be relegated to the background. Furthermore, as Drucker (2020, p. 54) elucidates, a graph or chart does not merely present raw data; its structure and design choices provide insight into the values and priorities of its creator. Therefore, when designing a visual representation, it is imperative to engage in thoughtful deliberation regarding the elements highlighted and their intended significance.

Parameters may either be deductively identified through research or educational theory (such as Laurillard's different types of learning (2013) or Gardner's multiple intelligences (2000)). Alternatively, they may be identified inductively through experienced practice, e.g. a

typology of students that an experienced teacher uses when creating groups in the classroom.

As with the purposes mentioned above, the learning designer should similarly aim at not having too many parameters. A visualization with several purposes and a dozen variables will quickly become too messy to communicate.

5.3 Step 3: Visualizing

At this point, purpose and relevant parameters have been identified. However, no visualization exists yet. In the craft of creating visualization, there are certain guidelines that, according to Drucker, are appropriate to follow. Among these, Drucker refers to cartographer Jacques Bertin, who in his *Semiology of Graphics* from 1967 (Bertin, 1983) developed a systematic approach to mapmaking based on graphical variables. It is crucial to approach the creation of visual representations with careful thought and consistency, especially when deciding how to display and discuss various parameters. The variables that Bertin puts forth in Figure 2 – shape, size, hue, value, and texture – facilitate the efficient, accurate communication of both qualitative differences (e.g. curriculum themes or emotional responses) and quantitative differences (e.g. attendant rates or hours spent on an activity) within data or ideas. By manipulating these variables, designers can highlight patterns, contrasts, or correlations, making complex data more accessible and intelligible. Bertin's framework is pivotal for creating visuals that accurately reflect the intended information, aiding comprehension and decision-making processes in various research and professional fields.

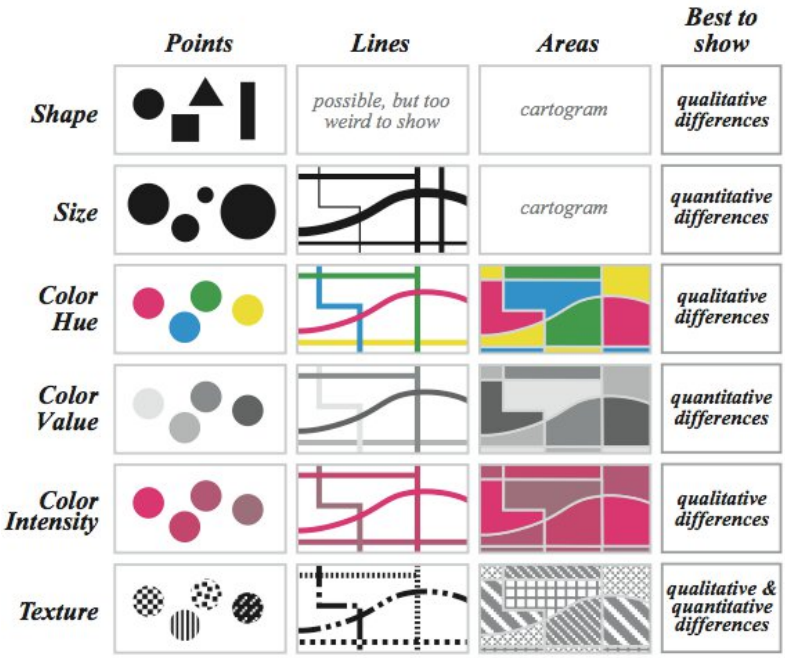

Figure 2. Jacques Bertin's graphic variables (Drucker, 2014, p. 58)

Jacques Bertin's graphic variables provide a systematic framework enhancing rigor in learning design visualization. This methodology

ensures consistent interpretation of qualitative and quantitative educational ideas and data. By visually decoding learning design, educators can accurately identify, assess, and communicate pedagogical patterns, disparities, and outcomes. This precision fosters a more informed approach to curriculum development, teaching methodologies, and student engagement strategies, thereby elevating the efficacy and integrity of educational processes.

6.0 Applying the framework

To illustrate the use of the framework, we start by simply showcasing how the three steps might look if applied upon themselves. The purpose of the visualization is concerned with answering *what* is to be visualized and *when*. Accordingly, what the visualization is concerned with is record-keeping and time-keeping. With respect to time-keeping, the visualization should aim to support the sequential aspect of the three stages presented in the framework. Yet each stage also contains its own sub-elements with qualitative differences which entails the other overall purpose of the visualization, namely record-keeping. Below are three different examples of what such a visualization might look like upholding the guidelines from Bertin's variables.

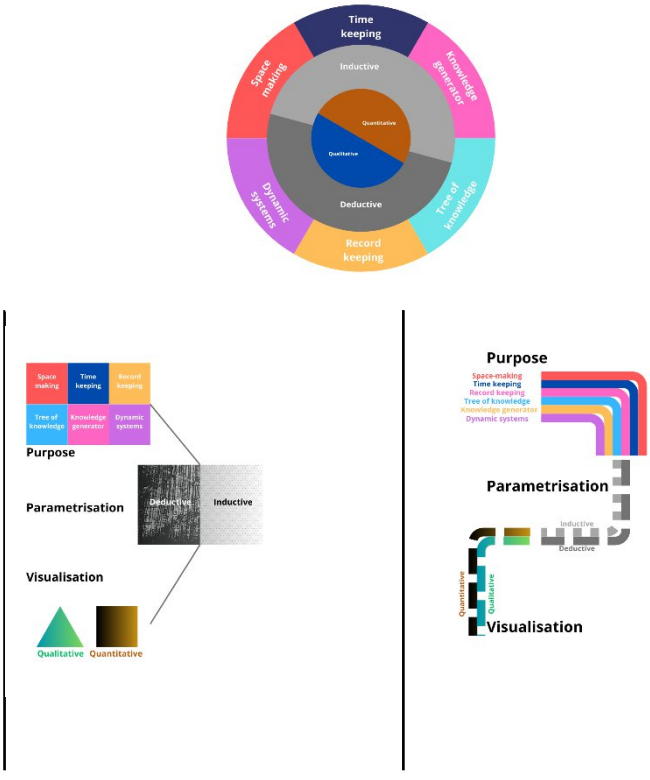

Figure 3. Three different versions of A framework for understanding the process of visualizing learning designs in three steps

The visualizations diverge in the extent to which they support the sequential aspect of the three stages. The first visualization provides only minimal support for a sequential reading of the stages, as the circle's layers do not suggest a clear direction for the eye to follow. One could read from the center outwards or vice versa. The remaining two visualizations, conversely, adopt a cascading approach, with the connecting lines in the central visualization reinforcing the notion that the stages are interconnected.

Regarding the visual aspect, the visualizations utilize Bertin's variables in diverse ways, such as size, color, texture, etc. In the center figure, all three steps are given equal area, suggesting a parity among them in terms of importance. This contrasts with the figure on the left, where the purpose, represented in the outermost layer, is allotted a larger area, potentially signifying its heightened importance or prominence. In the figure on the right, each purpose is represented by its own line on a diagram resembling a subway map, which could suggest that, similar to selecting a single train route, only one purpose can be pursued at a time. This notion of selectivity is not as apparent in the two other visualizations.

Now that we have seen how the framework can be applied in a rudimentary way, let us turn our focus to an actual learning design and see what can be gained in terms of rigor and clarity.

7.0 Re-visualizing a learning design using the three steps

In the Larnaca declaration several illustrative examples of learning designs are presented to give a feel of what the field is trying to achieve. In the following we analyze and re-visualize such an illustration according to our framework.

An extensive example of a particular learning design concerned with the teaching strategy of role playing is presented in the declaration (Dalziel et al., 2016, p. 4-7) and supported by the following visualization:

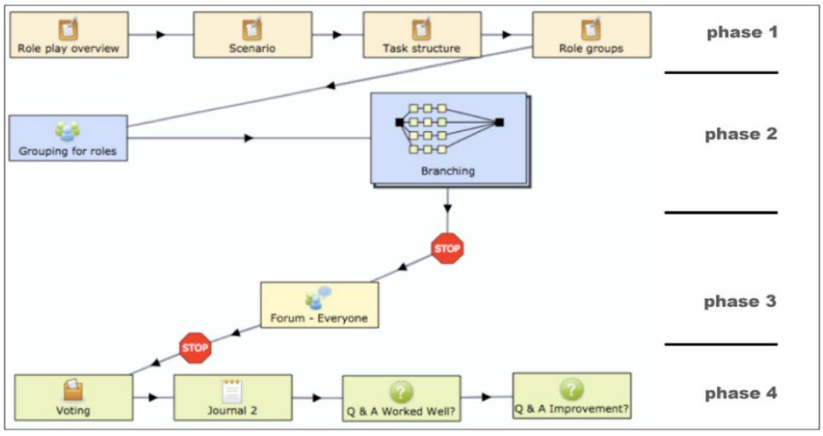

Figure 4. LAMS authoring view of interactive whiteboards adoption Role Play (Dalziel et al., 2016 p. 7)

The visualization is created through the open-source learning design system for designing online collaborative learning activities LAMS (The Learning Activity Management System) and is therefore to be considered an advanced interactive dynamic system. It contains three levels of description. As a user of LAMS, further textual instruction and information about the content can be obtained by clicking on the icons and the system also includes technical information regarding setup and configuration of online activities. While we acknowledge the depth and complexity of the LAMS, what we aim to focus on is the consistency and readability of the visual language of Learning Design. Here, the visualization *of the sequence of learning activities* that we are presented with in Figure 4 provides an excellent example of how the visual language of learning design is neither very developed nor consistent. According to the authors this particular learning design…

'"… seek[s] to describe the sequence of teaching and learning activities that make up the Role Play experience (the "what and how"). The goal of this description is to provide educators with enough information that they could replicate this teaching and learning experience."

(Dalziel et al., 2016, p. 6)

It seems, however, that the question of how on this first level is very much tied to an explanation of sequencing (indicated by the arrowed lines and the division into phases) and therefore in our framework aligns with the purpose of time-keeping and therefore is more concerned with the question of when. The purpose of the visualization is thus record-keeping (what) and time-keeping (when).

In terms of parameterization the activities represented via boxes take up the most prominent position in the learning design. These activities link to the purpose of visualizing what takes place during the course of the design. The other parameter as touched upon above is sequencing. The arrowed lines and the phase indicators thus attempt to answer the question of when these activities take place.

Concerning visualization, we identify eleven boxes with text and illustrations, two identical stop signs, twelve arrowed lines and four phase indicators. In terms of size, one of the eleven boxes is significantly larger than the others and phases 2 and 3 take up more space than the remaining others. Boxes in the same phase share colors and the two stop signs have the most intense coloring.

Drawing direct conclusions from the above using Bertin's systematic framework one would think that due to size the activity of *branching* would be quantifiably longer in terms of duration or another similar measurable indicator than the rest of the activities. Also, due to the difference in color the activities in each phase would deviate in a qualitative manner.

Based on the analysis using the three steps, our conclusion is that the visualization partially contradicts its own intention of providing an overview, as it rather creates confusion about which elements are

most significant and their interrelationships. If we were to suggest how one could visualize the same learning design with precision and rigor from the three steps alternatively, we have constructed two alternative visualizations of the same sequence below, which we briefly explain. To make it meaningful, we need to revisit the specific idea of the learning design: to create a role-playing sequence where prospective teachers weigh the advantages and disadvantages of using interactive whiteboards as a new learning technology.

In this first redesign, we maintain the initial purpose of the visualization of time-keeping and record-keeping. Aiming for a very simplistic visualization in terms of record-keeping, we differentiate between roles and activities. According to the design, students are either *themselves* as reflective students taking instructions or reflecting upon input or experiences or *in-character* as a participant in the role play taking on one of four possible roles. Additionally, activities take place while students are in said roles while the design progresses. In terms of time-keeping at least three paths are open to explore from the original design. Firstly, the four phases to the right indicate distinct types of activities as the design progresses from one phase to another. Secondly, the arrows that connect the activities, give the impression that each activity takes up a certain amount of time (ideally according to the size of it) and that the design simply consists of a series of activities without any shifts in modi. Thirdly, the two distinct stop signs indicate crucial time indicators in which participants of the design are instructed to wait until everything (and everyone) is ready to continue in a new phase of the design. In our re-interpretation of the design, we underline the importance of shifting roles and supporting stop indicators as parameters of time-keeping. This division is supported by the LAMS description as it states:

"The role play will have ***three main parts*** *– preparation, main discussion, and post discussion reflection. The roleplay uses Stop points to control this flow, so you'll need to come back regularly to check on new activities."*

(Dalziel, 2008)

In terms of time-keeping the learning design thus consists of three main parts in which students firstly are instructed as themselves, then take part in a role play in which there are four possible roles and lastly reflect upon their experiences as themselves again. This flow of roles and activities may be visualized as follows:

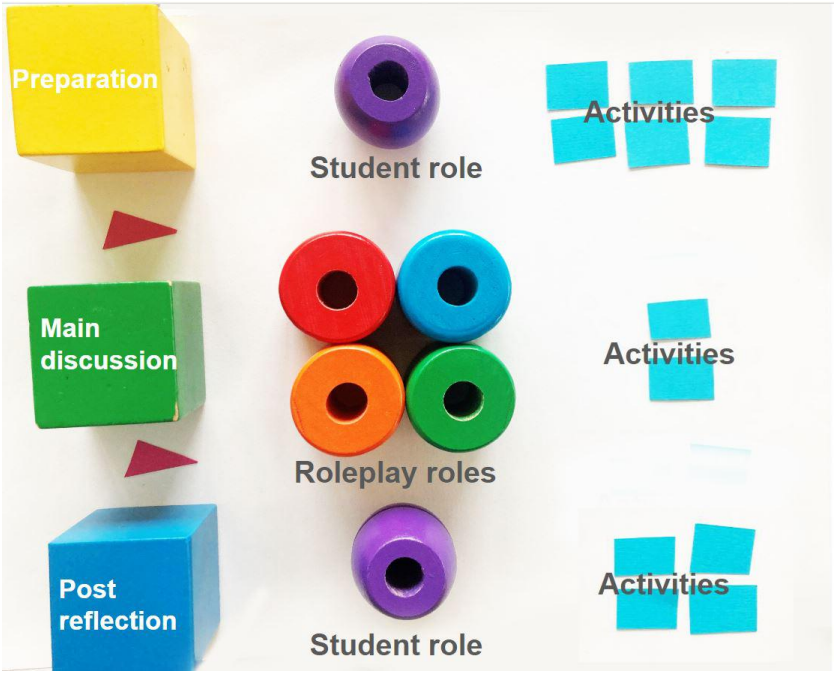

Figure 5. Re-visualization version 1 of interactive role play design with emphasis on timekeeping and roles

As the design mainly operates with qualitative differences, we have opted to use shapes, color hue and texture to differentiate between the key parameters of the design. The squared boxes in different colors to the left indicate the the main parts, the circles in the middle represent the different roles of the participants (with the purple circle in part 1 and three being the same) and the blue boxes to the right aim to visualize that each part consists of a series of activities that the participants take part in according to their current role.

Now, if we abandon the purpose of time-keeping altogether and instead focus solely on the different activities of the assigned roles, a representation for the Learning Design might look as follows:

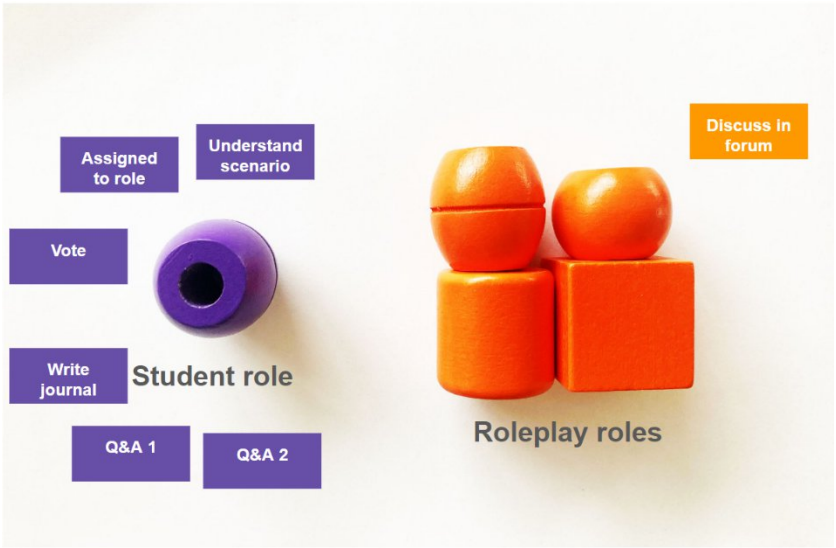

Figure 6. Re-visualization version 2 of interactive role play design with emphasis on activities and roles

Here, we see that flat squares indicate activities and 3D figures represent roles. The two distinctly different color hues cluster certain activities with certain roles. This visualization presents a different view of the learning design and might indicate to the designer the more fleshed out role of the student and the less so of the roleplay roles.

The two redesigns underline one of the main arguments of this article, that the aim of a learning design should not be to show all elements or parameters of the learning sequence, rather the designer when visualizing it should intentionally focus on parts of the full design. Such representations could be viewed more as *resources for reflection and dialogue* than pre-programmed *plans for action* (Konnerup, Ryberg & Sørensen, 2018). The aim is not to fully visualize every instructive part of a teaching sequence, rather it is to give the professional teacher a specific perspective on a relevant aspect of a novel learning design that might spark inspiration for interpretation or the realization of new design ideas.

8.0 Conclusion

In alignment with the initial objectives set forth in our introduction, this study's integration of Johanna Drucker's visual theories into Learning Design illuminates a foundational approach to visualizing educational concepts and learning design. The three-step framework we proposed – purposing, parametrization, and visualization – serves as an initial exploration into how educators might represent pedagogical strategies visually in a rigorous manner.

The first step is to choose the overall purpose of the learning design among the six historically derived purposes identified by Drucker: time-keeping, space-making, record-keeping, trees of knowledge, knowledge generators and dynamic systems. The second step entails identifying and choosing the most relevant parameters to help illustrate the intended purpose. There is no fixed list of relevant parameters to all learning designs, but parameters may either be deductively identified through research or educational theory identified inductively through experienced practice. The third and final step is concerned with actual visualization of the learning design and follows the guidelines of Bertin in terms of using shape, color hue, color intensity and sometimes texture to visualize qualitative differences and size, color value and also sometimes texture to visualize quantitative differences.

We recognize that our framework is just a starting point. Future research should delve deeper into the realization and interpretation of produced learning design in diverse educational contexts. Investiga-

tions into how learning designs facilitate action planning and reflective practice in real-world settings would be particularly valuable. This contribution aims to encourage further discourse and experimentation within the learning design community, fostering a richer understanding of the intersection between visual theory and learning design.

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Author Profiles

Peter Gundersen, is an associate professor at University College Absalon, Denmark, where he occupies a position in the research programme Digital Technology, Learning & Design. He has published several articles on emerging formats of education, design methodology and learning design. Peter has a background in educational philosophy and earned his PhD in Design-based research at the Department of Learning and Philosophy at Aalborg University in Copenhagen.

Bjarke Lindsø Andersen is a senior associate lecturer at University College Absalon, Denmark, where he is part of the research programme Digital Technology, Learning & Design. His research focuses on the relationship between digital technologies, teaching practices, and learning design. Bjarke has published on topics such as technology education, digital didactics, and teacher authority in digitally mediated learning environments. He holds a PhD in Science and Technology Studies and has a background in education and learning sciences.

Anne Kristine Petersen: expert text mentor

Author Details

Peter Gundersen
University College Absalon
Trekroner Forskerpark 4
4000 Roskilde
Denmark
+45 72482383
pgu@pha.dk

Bjarke Lindsø
University College Absalon
Trekroner Forskerpark 4
4000 Roskilde
Denmark
bjan@pha.dk

Anne Kristine Petersen
University College Absalon
Trekroner Forskerpark 4
4000 Roskilde
Denmark
akt@pha.dk

Editor Details

Prof. Dr. Tobias Jenert

Chair of Higher education and Educational Development
University of Paderborn
Warburgerstraße 100
Germany
+49 5251 60-2372
Tobias.Jenert@upb.de

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