Pictorial and Spatial Image Learning – Using Diamond Ranking to Understand Students' Perception of Learning Environment

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Abstract. The academic world of research, in particular, can be seen as "a sea of words and more words, in which visually based communication [is] not taken as serious intellectual products" (Collier 2001, p. 59). Furthermore, scientific texts are often written in an elaborate language which is particularly difficult to understand for students and novices in research. A visual method seems to facilitate access to research, especially for students who first need to develop a scientific research habit.

Therefore, the present study uses the participatory, image-based method of diamond ranking, to facilitate a more accessible approach to research in educational science. Diamond ranking is a recognised thinking skills tool which is designed to facilitate talk and encourage people to consider their own value positions on a given topic (Clark, 2012). With respect to research into learning environments, the use of photographs in a diamond ranking activity resonates extraordinary well with people as it explicitly encourages them to consider their relationship to the physical space and how it influences their beliefs about learning and teaching (e.g. Woolner et al. 2010). This study therefore has two objectives: to show how students can learn to assess learning environments, before moving to analyse students' preferences for certain learning environments based on the resulting products.

Keywords: Pictorial Image Learning · Spatial Image Learning · Learning Environment · Participatory Research method

1 Learning to Research: Seeing and Understanding

The rationale behind the study is that there must be other ways to learn how to do research besides reading studies. Usually, students are introduced to the respective research context through a basic lecture and exemplary analysis of studies already conducted in the relevant research field. In addition to conveying the essential basics, however, it is necessary to give students their own access to research, research questions and research methods. Here, on the one hand, the approach of research-based learning (Huber 2009, 1970) and, on the other hand, the explorative and participative research approach, such as the context of action research, can be used. Both possibilities show their particular

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advantages in educational studies to support students and teachers in their development of research and teaching. Stadler-Altmann (2021; Stadler-Altmann et al. 2018) demonstrates how these approaches can be used efficiently in teacher training programs. However, the research activities here are also very text-heavy and allow students to access independent research mainly through the written word.

Images should also be applied as an object of research and teaching since on the one hand, observation must be learned as a central task of teachers during their studies. On the other hand, images trigger emotions and reactions in the person looking at them, which can stimulate one's own convictions and views. Through the use of images, implicit theories can be brought up and the students' reflective competence can be stimulated (Grau et al. 2004). However, therein lies the challenge for research working with visual methods. Images are perceived in more emotional terms and correspondingly they have more personal connotations than texts, which can convey a certain distance through written language. Therefore, when using visual research methods, not only the corresponding method but also the visual material must be carefully selected, so it is appropriate for the research interest.

In the present example, photographs of school buildings, classrooms, kindergarten buildings and group rooms are used in the context of a course in general didactics, assessing the design of educational environment. On the basis of photographs, students are asked to assess buildings and rooms in terms of their design/layout and their potential functionality. At the same time, they should become aware of their previous personal experiences, attitudes and implicit theories about teaching and learning in schools and kindergartens. This demonstrates the particular importance of the selection of photographs for the course and the subsequent study.

1.1 Usage of Photographs

Images as a shared social practice are indispensable in our environment, both in everyday life and in research; Kamper (2000) speaks of an "image compulsion", Flusser (1983, 1997) of a "flood tide of images" and Latour (2002) of an "iconoclash". As an "eye animal", humans are particularly attentive when images are used, but researchers must bear in mind that images are not the same as the depicted world and only show a section of it: „Die fotografischen Bilder zeigen nicht die Welt, sondern eine Vielzahl von Vorstellungen über die Welt. Mit jedem Blick durch den Sucher der Kamera wird ein Blickwinkel, eine Perspektive gewählt, mit der die Fotografin bzw. Der Fotograf ausdrückt, was sie oder er sieht, darstellen will oder soll. Durch das Auslösen der Aufnahmen, die Entwicklung des Films und die Vergrößerung wird die Aussage fixiert"[1] (Pilarczyk & Mietzner 2005, 25).

Accordingly, when selecting photographs for teaching and research, the specificity of the photograph as a source must be considered. Following the summary by Pilarczyk and Mietzner (2005: 106/107), these research-relevant aspects in particular were

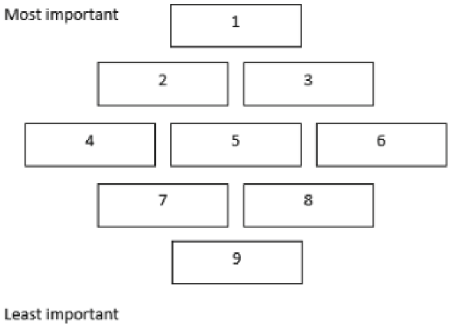
[1] "Photographic images do not show the world, but a variety of ideas about the world. With every glance through the camera's viewfinder, a point of view, a perspective is chosen with which the photographer expresses what he or she sees, wants to represent or should represent. By releasing the shutter, developing the film and enlarging it, the statement is fixed". [Translation by the author].

taken into account when selecting the photographs for this study: Indexical quality, perspective norming, historical change, entanglement of perspectives, overdetermination, communicative practices, form & aesthetic effects and self-presentations and presentations to others. Finally, the selected photographs should serve a pedagogical purpose in the context of the course and, on the other hand, depict pedagogical learning environments. Therefore, the choice fell on photographs without people, or with only a few people, and on photographs from recent school history. All photographs should therefore encourage students to remember their own kindergarten and school days in order to prompt their mnemonic access to the topic of teaching and learning in a physical learning environment.

1.2 Diamond Ranking Method

Clark (2012) describes the diamond ranking method in detail as a method that is particularly suitable for involving younger children in the research process. Clark emphasises the participatory character it gives to the research and describes the role of the research team as motivator and observer. „Diamond ranking is a recognized thinking skills tool (Rockett & Percival, 2002), valued for eliciting constructs and for facilitating discussion. Its strength lies in the premise that when people rank items, either statements, objects or images, and discuss the ranking choices, they are required to make explicit the over-arching relationships by which they organise knowledge, thus making their understandings available for scrutiny and comparison." (Clark, 2012: 223). Based on this, the method can also be used to generate not only new views and ideas, but also to make prior experience and prejudices visible. In the work with students that is the topic of this paper, the method is used to make implicit pedagogical concepts and (pre-scientific) didactical theories which are known by the students visible. Then, following on from this, pedagogical and didactical theories can be presented at a scientific level and linked to the students' world of experience.

In the original conception of the method, short statements, anecdotes, or values are given. These are then arranged in the form of a diamond and subsequently scored. Previously agreed criteria are used and named accordingly (more detailed in Clark 2012:



Position	Purpose
1	
2	
3	
4	
5	
6	
7	
8	
9	

Fig. 1. Diamond ranking instrument (Morrison, 2016: 112)

223–225). The work is usually done in small groups of two to three people and the result corresponds to this schematic diagram (Fig. 1):

In cases where photographs are used for the diamond ranking method, the visual character of the method is emphasised. The selection of the photographs determines the topic of the discussions. For comprehensive reasons and if a diamond ranking needs to be used for a study, the discussion about the evaluation of the photographs must be documented. This can be done by taking notes next to the photographs or by recording the discussions. Only then it is possible to analyse the resulting diamond rankings at a later time, as Clark (2012) and Clark et al. (2013: 6–8) have shown. However, further analyses of this analytical research approach are still lacking, especially in educational science (Wall et al. 2012). Only sporadic recent methodological studies can be found on this (Niemi et al. 2018). In order to track down beliefs and attitudes, the diamond ranking method is used more frequently and combined with additional survey methods, such as with peer interviews to prompt participants to elaborate on their choices. (Morrison, 2016).

2 How to Teach and How to Research with Diamond Ranking

2.1 Learning How to Access Learning Environment

The word-heavy educational research on space and spatial perception made it difficult for students to familiarise themselves with this topic. Yet the design of learning environments is a central aspect for good, successful teaching-learning processes (Meyer, 2020: 120). Students must learn to assess learning environments so that they can later design school buildings and classrooms in their professional practice.

To be able to assess the advantages and disadvantages of a learning environment, experience should first be gained in pedagogical practice in very different buildings and spaces. This happens during the teacher training program through internships and a joint reflection of the practical experiences in the courses. Regarding the assessment of learning environments, however, it is often neglected that the experiences gained in the internships are experiences from the teachers' perspective. Learning environments are then perceived and evaluated accordingly from this perspective. Students, however, have also experienced various learning environments as pupils prior to their studies, which in turn influence the observations and evaluations they might make during their training. For students to come to understand their prior experiences, attitudes, and beliefs, they first must be made aware of them. This is because, according to Grau et al. (2004), our fundamental beliefs are not consciously expressed.

In the teaching project on which this paper is based, the diamond ranking method is used to make students aware of their implicit beliefs and personal experiences when assessing learning environments. Therefore, nine different photographs of each of four typical learning environments (school buildings, classrooms, kindergarten buildings, and group rooms) are selected and provided to students. In groups of 8 to 10 students, these photographs have been viewed, evaluated, and diamond ranked. In the process, the students also noted their reasons for a positive or a negative evaluation of the photographs.

By means of the design of a diamond ranking on a poster (see Fig. 2), the questions: "Where would I like to work and why?" were to be answered and justified by the

respondents. In order to be able to answer this question not only spontaneously, they were also familiarised with general didactic considerations of room design and its significance. Further, aspects of teaching according to the ten characteristics of good teaching by Hilbert Meyer (2020) and the importance of spaces in kindergarten (Grießmair, 2017) were introduced. Afterwards, the students of the lecture worked in groups using the diamond ranking method.

Fig. 2. Student work results (examples)

Regarding this question, the students actually paid attention to the requirements for their future activities in school and kindergarten. In the assessment of classrooms or group rooms following keywords can be observed:

+: hell, freundlich, vertraut/Inseln, verschiedene Angebote/kreativ/von Kindern mitgestaltet/gemeinschaftsfördernd

-: kalt, steril, eng/erdrückend/wirkt leer/keine Rückzugsmöglichkeiten/wenige Anregung[2]

A tendency in the evaluation towards traditional and familiar room designs is noticeable. Group rooms in the kindergarten were rated rather positively if the room is furnished for the activity of a fixed group. Notably, an open, flexible, and unusual furnishing of the rooms leads to an honest and neutral evaluation. When evaluating school and kindergarten buildings, students seemed to be guided more by their design preferences. Here,

2 +: bright, friendly, familiar/islands, various offers/creative/co-designed by children/community-promoting.-: cold, sterile, cramped/oppressive/seems empty/no possibilities for retreat/few stimuli [Translation by author].

across all student groups, quite modern building forms were selected and commented on positively:

+: Für Kinder ansprechend, weckt Kreativität, bunt, einladend

+: Harmonisches Erscheinungsbild, viele Fenster, bunte Außenfassade, natürliches Außengelände[3]

In the course, the students intensively discussed the design of the rooms, rather than talking about the building and other areas that could be used as a place of learning outside the classroom or group room. Here it becomes obvious that students still have the idea of a closed classroom or group room in mind as a stereotypical idea of kindergarten and school, in spite of having been exposed to open concepts in addition to clearly stating their preference for these concepts.

Therefore, it seems worthwhile to analyse the posters created in this course in more detail based on the arrangement of the photographs and the supplementary comments.

2.2 Visualizing Implicit Theories and Beliefs

52 posters with diamond rankings from five courses within five years of study are available for analysis. The posters were created in the years 2015–2019/2020 and were made by students in the seventh term. Most of the work was done in groups of eight to ten students, so that a total of 468 students were involved. Nine photographs from each of four different subject areas were processed.

Surprisingly, the arrangement of the individual photographs on the posters differs only slightly. So, it can be justified to consider the total sample first and then to point out special features afterwards.

First, the results for the four subject areas are presented. For this purpose, the individual posters of the students' groups were evaluated, i.e. the frequency of the respective photos on the rankings was counted, calculated in a table using excel and transferred to a diagram. From this, another diamond ranking was created, which illustrates the overall result. At the same time, the comments on the individual images are evaluated according to the categories: architecture, function, emotion and pedagogy. Summarised key points of the individual notes according to their frequency are given in tables.

These analysis steps are presented as examples for the students' evaluation of the school buildings (Fig. 3a, 3b[4]). Due to space restraints, the focus below is on school buildings, with the overall results reflecting the kindergarten, classrooms and group rooms.

It is remarkable that the modern school buildings tend to be evaluated positively and judged according to their overall architectural appearance. A pedagogical evaluation, which assesses the usefulness for teaching and learning, is not found in the comments (Table 1).

[3] + Appealing to children, awakens creativity, colorful, inviting. + Harmonious appearance, many windows, colorful exterior facade, natural outdoor area [Translation by author].

[4] For this illustration, the photographs used in the study were drawn by the author.

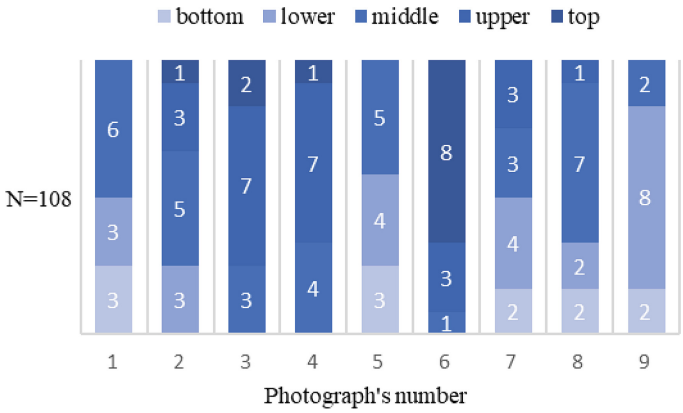


Fig. 3a. School building: diagram

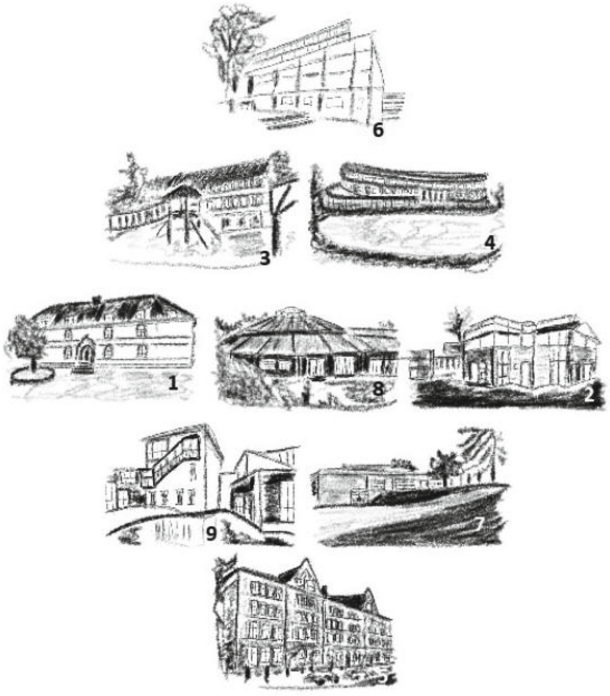


Fig. 3b. School building: diamond ranking (© Stadler-Altmann)

Sample Heading (Forth Level). The contribution should contain no more than four levels of headings. The following Table 1 gives a summary of all heading levels.

Students actually evaluate school buildings more on the basis of spontaneous external impressions. The associations and comparisons that come to their mind are essential. As Rittelmeyer (2016) also shows, the first impression, spontaneous associations and

Table 1. School building – Students' comments (summarized by categories)

Nr.	Categories			
	Architecture	Function	Emotion	Pedagogy
1	Few windows, old-fashioned, old, no garden area		Boring, strict, monotonous, barren	
2	Modern, colorful, bright, own	Office building	Inharmonious, uninspiring	Risk of injury
3	Plenty of space, many windows, light, attractive facade	Playground	Inspiring, inviting	child-friendly
4	Many windows, light, air, bright	office-like	Natural, calming	Danger zones (water)
5	Old building, directly on the street	university, boarding school	Cold, unforgiving, military, serious	
6	Modern, colorful,	sports field	Inviting, joyful	
7	Concrete block, few windows, large meadow	bunker, prison	Bare, dreary, cold	
8	Gloomy facade, little space, dark, different type of building	dome	Too genteel, cozy, familiar	
9	No green space, glass front, old-fashioned, small	residential building	friendly	safety?
Σ	Facade & windows, outdoor area	Associations	Rating	Safety supervision

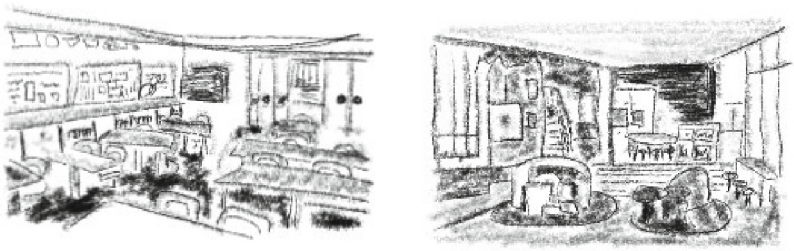
feelings are the most significant contributing factors to an overall impression. This, in turn, is shaped by their own school experiences. This sample also shows that professional, pedagogical and didactic considerations are not named and considered by the students.

A similar result can be observed for the students' evaluation of the kindergarten buildings. Here, the photographs at the top of the diamond rankings were predominantly those that coincided with the students' childhood memories. It is striking that the adjectives "inviting & cheerful" or "not inviting & dreary" and "suitable for children" or "not suitable for children" were frequently chosen in the marginal notes on the photographs.

In the evaluation of the photographs of classrooms and group rooms, the students place more emphasis on the pedagogical functionality of the rooms. In the analysis of the comments on the diamond rankings, references to pedagogical and didactic theory can be found again and again. Explicit reference is made to the situation of teaching or educational activity in the kindergarten. Students write, for example, about

the photographs of classrooms: „Sitzkreis, Montessori, Wechsel der Unterrichtsmethoden möglich, kindgerecht, alle Sozialformen möglich"[5]. The following comments can be found on group rooms in Kindergarten: „gemeinschaftsfördernd, von Kindern mitgestaltet, freies Schaffen, Spiel- und Rückzugsmöglichkeiten"[6].

The photographs most frequently placed in the top position of the diamond ranking can be seen in figure four. The drawings also consider the students' descriptions of the rooms (Fig. 4).



Classroom Group Room

Fig. 4. Students' Favorites (© Stadler-Altmann)

The quality of the photographs was almost not included by the students in their discussion. On the 52 posters, there are only two references to the fact that the colourfulness and the perspective of the pictures influence the impression. It can therefore be assumed that the selection of the given photographs does not influence the students' evaluation of the images. Instead, personal impressions and preferences are decisive.

3 Conclusion

This analysis is guided by the students' perspectives on learning environments and to which extent pedagogical convictions and implicit didactic theories can be made clear in the selection of images.

By assessing learning environments, the evaluation of learning spaces as well as underlying pedagogical convictions become visible. Nevertheless, methods which make more use of visual and spatial material can widen participation to include all users and be particularly appropriate for examining the contribution of the physical setting to the learning environment (Lodge 2007; Prosser 2007).

With regard to the assumption that the use of a visual method also makes educational research itself more interesting for students, it should be noted that as a result of the work with diamond rankings in the courses of general didactics, significantly more Master's theses were written with participatory and visual research methods, especially from the students involved in the study which has been the subject of this paper.

[5] "Sitting circle, Montessori, change of teaching methods possible, child-friendly, all social forms possible". [translation by author].

[6] "community-building, co-created by children, free creations, opportunities for play and retreat" [translation by the author].

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