Phenomenographic Enhanced Video Analysis

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Abstract
The Phenomenographically Enhanced Video Analysis (PEV) aims to identify framework conditions and situational aspects of a learning atmosphere in the context of school teaching. The starting point of PEV is always the contextual investigation of contingent teaching sequences with regard to the characteristics of interactions as the basis of a specific learning atmosphere. The method evaluates videotaped lessons in three steps. (1) The video sequences are narrowed down according to the answers to the "Quicktest" (QT), in which the learners are briefly asked about the topic at the end of the teaching unit. In the next step (2), an extended research team reduces the generated video artefacts into a data pool according to a predefined question profile. This forms the core of the final data interpretation and reflection (3). In the final analysis process of the PEV, special attention is paid to the immersion in the video material during the reduction process using the immersion-crystallisation analysis method.

Keywords: Learning Atmosphere, Phenomenography, Video Analysis, Immergence Theory

Introduction

A learning atmosphere experienced in a classroom influences the learning, actions and behaviour of learners and can have an inhibiting or stimulating effect on learning processes such as cooperation and communication (Pfrang, 2020). The term classroom climate is limited to the learning environment and school characteristics, while the classroom atmosphere, conceptually derived from phenomenology, includes extended dimensions such as interpersonal relationships, interactions or room design (Eder, 2002). The learning atmosphere has an inclusive status, refers to a holistic orientation, and is addressed to the learning of *all* students (Pfrang, 2020). In order to understand the learning atmosphere, the authors developed the *Phenomenographically Enhanced Videomethod* (PEV), which analyses video recorded lessons to detect the framework and situational requirements of a certain learning atmosphere. PEV was developed within the European project ACIIS (Hoffelner & Laven, 2024) in the context of the Laboratory for Aesthetic Education. The use of the qualitative research approach for PEV is based on the avoidance of an artificial laboratory conditions, and focuses on the active participation of the observers in the events (elimination of the subject-object separation). It promotes a holistic view of behavioural patterns instead of measuring individual variables, and thus advocates openness to new insights and observations in the course of the research process (Adler & Adler, 1994).

Phenomenography

Schmitz (2014) understands atmosphere as the extended filling of an arealess space in the realm of experienced presence. Böhme (2001) speaks in a dualistic sense of an ego pole, the subjective component and an object of perception as the basis of sensing, which in turn is the basis of atmospherics. The more perception is dedicated to the "presence of something" in the meaning of a certain object, the more it distances itself from the atmospheric. According to Böhme, the objective experience of atmospheres takes place on the one hand, on a spatial approach (*ingression*) and, on the other hand, on the deviation of the personal mood being introduced (*discrepancy*). The PEV approach is thus linked to the philosophical understanding of phenomenology, whereby the experiential structures of the subject's perception are always embedded in the context of their relationship to the world. Perception is to be conceptualised as it is experienced by the perceivers and their world, a distinction is to be made within its appearance, by the phenomenon within the world in which we live. (Gallager & Zahavi, 2021) Instead of concentrating purely on the objects of cognition, the experiential dimension is described and analysed in order to be able to include the cognitive contribution of the perceiving subject. (Husserl 1984) Although a phenomenological description decidedly encompasses the perspective of first person, it has intersubjective validation and objective validity as basic rules of scientific quality (Alloa, et al., 2023).

Bodiliness (“Leiblichkeit”) is one of the most important basic concepts of phenomenology, especially with regard to interdisciplinarity in effect and application, it covers an important area of research as a body-body difference. (Wehrle, 2023) Schmitz (1990) distinguishes between the physical body (“Körper”), which is experienced indirectly through the senses, and the embodied body (“Leib”), which is experienced through sensing. Embodied sensing is an interplay of contraction and expansion, representing inhalation and exhalation as a sounding board. It absorbs external elements such as looks, gestures, moods, atmospheres and feelings in an antagonistic (non-symmetrical) and solidary (communal) way. Feelings are described by Schmitz (2014) as quasi-spatially extended atmospheres in which several subjects can participate equally. Böhme (2001) defines atmosphere as something that cannot

be completely distanced from without, as we have already said, collapsing or contracting into one thing. The perception of atmosphere is linked to presence as a sense of the presence of others or of something else. It is therefore something that is difficult to encode, difficult to categorise and not critically defined in the process of image interpretation.

Phenomenography is about the different meanings of the same things or ways of seeing, experiencing and conceptualising, where "things" refer to anything that can have different meanings. (Marton & Booth, 2014) Observations are used as qualitative research methods to study human experiences. (Lo, 2015) The central element of phenomenographic research is thus the internal relationship between the experiencing person and what is being experienced, as opposed to research on human behaviour, mental states or neural representations (Marton & Booth, 2014). The aim of many phenomenological studies is to work on the variation of the experience of the phenomenon of interest in terms of qualitatively different categories. (Marton & Booth, 2014) Phenomenography attempts to describe "how the world appears to others" (Marton, 2014, 113), how the world might be seen or experienced by others. This can concern a whole group as well as individuals and relate to a group via a single experience variation. A complex of different description categories of the different experience variations then forms the domain of findings. Phenomenography and phenomenology share the common object of exploring human experience and consciousness, and differ in the way they approach the subject. In phenomenography, the structure and meaning of a phenomenon can be investigated both in preflective experience and in conceptual thinking; the focus is on variations of living and experiencing, variations between perspectives and the resulting competencies of action (Marton & Booth, 2014).

A phenomenological theory is characterised by the fact that it dispenses with investigations into deductive deductions or inductive empiricism and describes the view as structural features (Staiti, 2023). In its research into the learning atmosphere, PEV draws on Čižek's findings on the free learning space (Laven, 2006) and the definition of an immergent learning environment where learners can immerse themselves and indulge in deep learning (Swoboda, 2019). The "Vienna Youth Art Class", founded around 1920 in Vienna by Franz Čižek, was intended to be a place of astonishment; the class atmosphere was of particular importance, the space was free from corrections and possible resulting disappointments as well as frustrations. In contrast to school life at the time, the children were allowed to move around freely (Laven, 2006). The learning environment of the immergence theory according to Swoboda (2019) consists of an atmosphere in trusted surroundings as the *Gate of Familiarity* to enable a mental immersion process. The Gate of Familiarity is a mental experience space filled with positive impressions that radiates safety and familiarity. *Synchronous Consertation* is the consolidation of many individuals into one commonality, *perspective Transmission* is the establishment of relationships and relations in this space. The individual perspective comes to the fore, forming a subjective approach to the immediacy of human vulnerability and social need for one another (Swoboda, 2023).

Videography

PEV focuses on the analysis of video recordings, a sequentially ordered representation of interactions, in order to find out how individuals orientate themselves towards each other and coordinate with each other. The technical possibilities of a video analysis offer the advantage that it can be carried out in real time, but also in slow motion and in repetition (Brinkmann & Sales Rödel, 2019). A fundamental distinction must be made between standardising and interpretative video analysis. In standardising video analysis, the recordings are subjected to

an evaluation based on predefined coding plans. Interpretative video analysis, which is used in this research method, supports the inductive approach in order to understand the recorded interaction between the actors.

Videography aims to analyse social situations that are recorded on video. The collected video data allows the preservation of aspects in their temporal sequence and gives researchers repeated access to past events (Tuma & Schnettler, 2014). Videography does not claim to be documentation, but instead stands for a paradoxical documentation (Fankhausen, 2013) as an oscillation between proximity and distance or between field and science. What is special about videography is the combination of field research with subsequent extensive material analysis of the recorded interaction sequences (Tuma & Schnettler, 2014). The combination of both approaches in the research process makes it possible to systematically consider and evaluate factual contexts from interactions of acting subjects, from events of the learning space and from contingencies of events in microanalysis. The PEV follows the videographic data collection within an iterative procedure (Tuma & Schnettler, 2014) without using a completely fixed research plan in advance. An initial interest serves as the starting point for a step-by-step narrowing of the research question with a simultaneously growing data corpus. The videography itself does not serve as a case analysis, but as a comparative procedure within a body of material for the investigation of limiting phenomena and structural repetitions (Tuma & Schnettler, 2014).

When setting up the technical equipment, a *limitation on the first order* of data recording arises, as the researchers already determine the direction of view of the research field by aligning the camera in the triangle of line of sight, camera section and perspective focus. Showing on the basis of the recording therefore also includes not-showing based on those lines of view, sections and focalisations in which the other is excluded (Fankhausen, 2013). The problem of the *invasiveness* of the camera means a *limitation on second order*; the technical aids used should be rendered invisible by making them as transparent as possible (Borck, 2001), thereby avoiding situational disturbance effects. This invisibility is a priority; the invasiveness should be contained on the ethical side by thoroughly informing the participants about the aspect of the research as well as the handling of the data, and technically by the scientific core team carefully choosing the appropriate place for the camera.

Triadic Structure

The "Phenomenographically Enhanced Video Analysis" PEV follows the following triad:

1) Subject-Sighted data marking
2) Sequenced video artefacts
3) Immersion-Crystallisation analysis

The first triad, subject-sighted data marking, is based on the Quicktest (QT), a short (online) questionnaire for learners at the end of the teaching unit. Here, participants indicate the situations in which they perceived a specific atmospheric situation. The QT captures subjective atmospheric perceptions in the teaching situation along a particular research question; these form the markers of the second triad. The aim is to record the participants' fresh, 'unfalsified' learner's impressions of the atmosphere, because a directed thinking about atmospheres in a specific way always creates a different ego standpoint relative to the initial atmosphere. In the perception of atmospheres, the subject is initially absorbed by the atmosphere and gets emotionally affected by its distance (Böhme, 2001). The aim of the

Quicktest is to capture the first 'fresh' subjective impressions: in the subsequent directed, reflective thinking, a transition from a subjective impression to an objective fact takes place. The questioning must therefore be carried out individually shortly after the respective lesson. The aim is to describe the situation in terms of the mood experienced by the participants. The situation depictions obtained by the QT subsequently become selective markers and form the basis of the second triad, the "sequenced video artefacts". In this step of the triadic investigation, individual video sequences from the collected video material are marked and highlighted as *video artefacts* (Seidel, 2022); they form the data material of the investigation. The situation depictions obtained by the QT subsequently become selective markers and form the basis of the second triad. In this step of the triadic investigation, individual video sequences are marked from the collected video material and highlighted as video artefacts (Seidel, 2022); they form the data material of the investigation. The video artefacts are searched for along the selective markers; the places specified in the QT must be identified and prepared for a detailed inspection. A detailed lesson plan helps to find the right place in the video. The timestamp of the point that was specified as a selective marker can be noted in it so that this marked video sequence can also be correctly labelled for the final triad. In this step, the sequences are entered into the *Immersion-Crystallisation* analysis according to Borkan (1999) and bundled into headings.

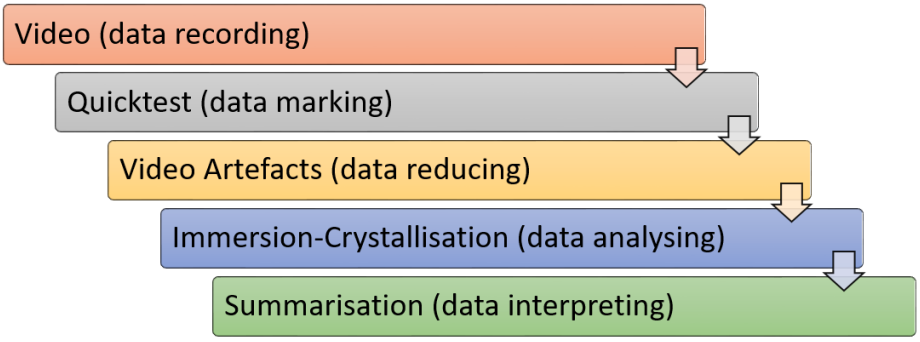

Figure 1: Step-by-step structure of the inductive, iterative process of PEV. In the first stage, the lesson is videotaped, marked using the Quicktest and then reduced to artefacts. The analysis via Immersion-Crystallisation leads to a summary and interpretation.

Essentially, this method is an inductive, iterative process of identifying themes, categories and patterns in the data. Inductive means that generalisations are drawn from specific observations, while iterative refers to a systematic, repetitive and recursive process.

Course of Action

Since the study is not aimed at the lesson content per se, i.e. it is not intended to evaluate its realisation or content preparation, the research approach is that of field research (Bortz & Döring, 2003). Rather, the natural constellations within the teaching situations are observed. The PEV approach is therefore inspired by field research in the stages of "planning and preparation", "acting in the research field" and "selection, analysis and evaluation".

A) Planning and Preparation

The starting point for planning the PEV method is a lesson plan for the course unit drawn up by the teacher. The templates used in teacher training are suitable for this, which usually include a planned content and time schedule. These two fields are often supplemented by the areas of "social form", as a learning setting for the group, and of "learning output", as a

definition of reflection and consolidation. The sequencing of selected video sections is carried out in the second triad with the help of this pre-planned schedule.

Based on the research question, the Quicktest of the first triad must now be formulated and set up. After a brief general explanation of the investigation, the query comprises the definition of the specific atmospheric phenomenon (along the research question) and two subsequent questions. The first question opens or closes the atmospheric perception in a decision question. In the case of a positive decision, the respondent is asked to describe the exact situation of the first sensory entry; in the case of a negative decision, the survey ends. The aim is to obtain a yes/no *declaration* on the atmospheric perception and a *determination* of the situation from the participants, so *when* they experienced the specific sensation within the teaching unit.

The stage of preparation at last concerns the nomination of the extended research team. Since the subsequent analysis via Immersion-Crystallization in the iterative process requires a multiple procedure to comply with the quality criteria in the research process, it is recommended to nominate an extended team in advance to extend the core team.

B) Acting in the Research Field

The camera script for recording (class) events includes at least one still camera in the room, which is mounted frontally from a slightly elevated "cavalier perspective". The aim is to capture as much of the action as possible. Depending on the technical possibilities, the recording process can be time-cyclical or full-time.

Figure 2: Example of camera placement considering the problem of invasiveness

The group of participants is once again reminded of the fact of the scientific recording, with special reference to the focus of the investigation, in order to avoid a possible interpretation as an examination situation, for example.

As far as possible, the researchers are actively involved in the classroom activities, in the best case they are part of the group and take part in the exercises. Active participation should make it easier to sequence the video artefacts later on. The more precisely the core team knows about the teaching process, the easier it will be to allocate the data from the data markers. Monitoring of the recording function should take place at regular intervals, at least during breaks. This should prevent the recording from being interrupted or even cancelled for technical reasons. In any case, attention must be paid to the problem of *invasiveness*; monitoring should be carried out in the background wherever possible and the flow of the lessons should never be interrupted, stopped or even repeated in the case of technical problems.

The Quicktest can be carried out via QR code as a query on the learner's own smartphone. The survey should be kept at a level where participants can complete it in a few minutes. As they are asked to record their impressions, the first subjective experience should be captured - almost purely, without any reflective "background noise". The Quicktest should therefore be carried out in the same room and immediately after the end of the session.

Once the questionnaire has been completed, the technical dismantling should begin and, if possible, the data should be backed up immediately.

C) Selection, Analysis and Evaluation

The detailed study of the video artefacts is based on a *global evaluation* (Legewie, 1994) in the levels of selection, analysis and evaluation. The first level, *selection*, involves viewing and organising the material as well as the important step of video sequencing of the second triad "sequenced video artefacts". The second level *analysis* follows the immersion-crystallisation method according to Borkan (1999) in iterative loops along the marked sequences. An inductive approach is used to collect keywords, comments and themes from individual patterns and themes. The final level *evaluation* involves the bundling, categorisation and documentation of the findings.

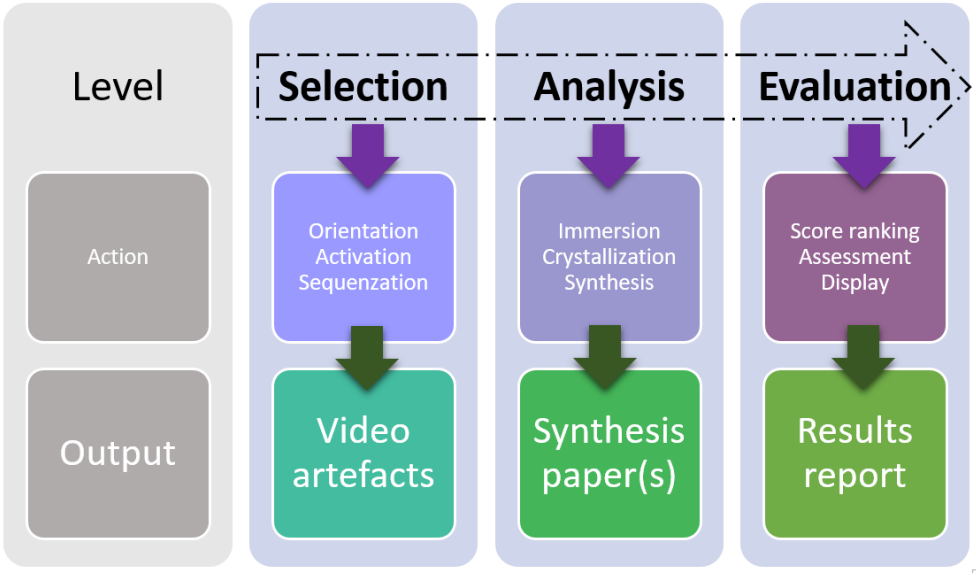

Figure 3: Setting up the PEV global evaluation

Selection

The selection process is organised by the core research team and consists of three steps:

1. Orientation: The video artefact is displayed on the existing lesson plan in order to obtain an initial overview and a rough structure.
2. Activating contextual knowledge: The existing material is further broken down and bundled according to the lesson plan. By visualising the plot constellation, structure and action, irrelevant parts of the material (pauses, interruptions) can be eliminated.
3. Sequencing: From the single artefacts, those sequences are marked on the lesson plan which were described as particularly significant or relevant in the first triad. These passages are edited into a video sequence out of the artefact material (e.g. by editing them into a separate video) or highlighted by annotating the time stamp on the lesson plan.

Analysis

The analysis is carried out by the extended research team using the immersion-crystallisation method: in an iterative process of immersion and reflection, a kind of intersubjective experience is created between the object of research and the researcher through the medium of data (Borkan, 2022). Although the method is a rational, analytical investigation, as a holistic approach similar to the experience of music or visual art, it means a *deep experiencing* of the data (Borkan, 2022, 787).

The analysis procedure is carried out in three steps, the first two of which are repeated in a loop until data saturation is reached in the third step:

1) Immersion (Borkan, 2022)
   This is the part of the process where the researchers immerse themselves in the data they have collected. The systematically selected sequences are minutely analysed. The research question is focused by documenting the temporal sequence and the orchestration of the actions as action sequences. According to Tuma & Schnettler (2014), the evaluation is not based on a predetermined scheme, but on precise observation and its increasing systematisation. When carefully reviewing the marked sequences, ideas and questions should be noted and labelled with the respective video timestamp. Any interesting idea should be captured in a visual or written auditing trail and labelled with concise headings and references to relevant parts of the sequence.
2) Crystallisation (Borkan, 2022)
   This is the step in the process where the immersion of the data is (temporarily) interrupted in order to reflect on the analysis session and attempt to identify and articulate patterns or themes noted during the immersion process. The artefact is screened to identify which tags or labels are being primarily expressed. Approximately 3 to 5 important tags per artefact are listed as keywords in an index (noting timestamp references). A summary of the artefact is written in 30 to 50 lines, with the most important content presented either in logical order (analytically) or in chronological order (sequentially). A motto or a concise tag serves as a heading. It is also possible to work with guiding questions instead: Is a further detailed analysis of the specific sequence to be undertaken promising? What questions does it raise? With what other artefacts might it be compared? All these considerations should be documented in writing.

3) Creative synthesis
   In the synthesis paper, data saturation is achieved through iterative loops of immersion and crystallisation steps. After initial patterns and interpretations have been recognised, at least one further loop is required to confirm the results or to seek alternative interpretations. The procedure is that of induction, in which a separate category scheme is created for each sequence. The findings are recorded in the synthesis paper, which forms the basic element for deductive interpretation at the final level of global evaluation.

Evaluation

The evaluation level is the final summarisation of the video artefacts and synthesis papers by the core research team and consists of the following parts:

1) Score ranking: Each video artefact will be ranked in terms of its relevance to the research question (peripheral/average/main) and considered according to the facts it reveals that go beyond the central topic of the study (2-5 evaluation keywords).
2) Overall assessment of the synthesis papers: In a short statement (approx. 20 lines), the scientific communication situation (credibility, comprehensibility, role allocation, gaps, distortions, ambiguities) will be assessed.
3) Display of results: The results of the work can be compiled into a small results report containing the following elements: Summary of the video sequences, presentation of the analysis procedure, statement on the overall investigation and any applicable evaluation plans.

Conclusion

The aim of the PEV method is to develop a tool for the phenomenographic investigation of specific teaching situations in which students experience a certain learning atmosphere. This will allow conclusions to be drawn about the setting of framework conditions and interactive activities for the learning atmosphere. The method is based on a philosophical understanding of phenomenology. The experiential structures of the subject's perception are always taken into account in the way they relate to the world. This involves the use of videographic recording methods; the use of technical equipment should not lead us to regard video data as objective representations. These data always correspond with the researchers' constructive achievements, such as the image section, the position of the camera and the reactions to the camera in the field.

The criterion of objectivity is prevented by the need for interpersonal consensus. The most important source-critical factor is consensual validity (Bortz & Döring, 2003) in the sense of interpersonal consensus building in the research team. As an indication of data validity, several participating researchers must agree on the credibility and significance of the material. PEV is based on the definition of an immergent learning environment in which learners can immerse themselves and engage in *deep learning* (Swoboda, 2019). Meseth, et al. (2012) refer to the collective experience of communication in the classroom the "social memory" of a school class as a teaching-learning community. An *immergent* learning environment as a particular learning atmosphere is a contingency-restricting enabling condition for factual learning *and* social control, as it establishes a social order through formal roles and makes the behaviour of individual participants expectable. Individual communication events can therefore be remembered and repeated in the social memory of the class community.

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