EDeR

Educational Design Research

Volume 9 | Issue 3 | 2025 | Article 85

Contribution Academic Article

Title **Educational pathway coaching as an innovative design component of a study-integrated programme – Implementation as part of a design-based research study**

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Abstract A significant proportion of school leavers are undecided as to whether they should pursue vocational education or embark upon further study following the completion of their higher education entrance qualification. Despite the wide range of available career and study guidance programmes, they do not feel sufficiently confident in their decision. For a significant proportion of individuals, commencing a degree programme often results in the phenomenon of dropout and reorientation. This phenomenon can be interpreted as a continuation of the vocational orientation or career choice process.

In the recently developed model of study-integrated vocational education (SiA), the decision regarding the choice of vocational education and/or study is only to be made upon the conclusion of a preliminary phase spanning 12 to 18 months, without this being associated with a dropout. The fundamental stage is accompanied by educational pathway coaching (EPC), the objectives and characteristics of which were initially only approximately defined.

The article provides a comprehensive account of the implementation of the EPC within the framework of the SiA, underpinned by the methodological principles of Design-Based Research (DBR). Following a thorough exposition of the methodological principles underpinning the research and the establishment of a theoretical frame of reference, the findings from the development and implementation processes are presented. Over two cycles of development, testing and evaluation, a goal-oriented implementation concept for the EPC was formulated from a practical perspective. This concept can be employed in a range of other fields of application beyond the narrower testing framework. A total of 29 "design principles" were developed as the substrate of the scientific analyses, which can guide the theory-based development of EPC concepts within the framework of the DBR concept as cross-case findings.

Keywords Study-integrated vocational education; educational pathway coaching; design-based research; design principles.

DOI The DOI will be added when the issue is published.

Citation Euler, D., & Naeve-Stoß, N. (2025). Educational pathway coaching as an innovative design component of a study-integrated programme – Implementation as part of a design-based research study. *EDeR – Educational Design Research,* 9(3), 1-37.

The DOI will be added when the issue is published.

Educational pathway coaching as an innovative design component of a study-integrated programme – Implementation as part of a design-based research study

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1.0 Problem definition and research focus

1.1 Challenge: Vocational and study orientation for university entrants

Die Berufsbildung For many decades, the issue of how to support young people in the proactive organisation of transitions, particularly the transition from school to work has been the focus of vocational education and training (Aktionsrat Bildung, 2023). This transition is of significance for all young people, although it is a very general and abstract term, and the forms of transition that can be organised depend on the target group.

If we look at the target group of young people who have obtained a higher education entrance qualification (HEEQ), their transition from school to work is characterised by the fundamental decision between pursuing higher education or vocational education. An alternative to these two options are dual study programmes, which have become increasingly attractive in recent years. Consequently, young people holding a HEEQ have different educational pathways available to them during the transition from school to work. This, in principle, enables them to make a decision, yet it also requires them to do so. The extent of autonomy in decision-making within the framework of these three basic educational and career pathways may vary and in turn depends on questions such as: Which specialisations or occupational fields are possible? Are (and if so, where are) the desired study or training places available? Beyond these specific questions, findings on dropouts and subject changes in particular indicate that the transition from general education to vocational education and higher education is not frictionless for some school leavers. In 2020, approximately 35% of students with German citizenship at universities and 20% at universities of applied sciences dropped out of their Bachelor's degree programme (AGBB, 2024, Tab. F4-5web). Around half of them continue their studies, albeit with a change of degree programme or university in order to correct their original decision and switch to a degree programme that better suits their interests and abilities (Meyer et al., 2021). Approximately 21% of university dropouts transition to vocational education, with approx. 18% subsequently securing gainful employment, a significant proportion of whom have already obtained a vocational qualification (AGBB, 2024, p. 224). Approximately 11% of individuals who have terminated their studies are either unemployed (4%), participated in an internship (3%), or engaged in other activities (4%) 12

months after the termination of their studies (AGBB, 2024, p. 301). The two main reasons given by those who have dropped out are "lack of interest and unfulfilled expectations" and "too high performance requirements" (Theune, 2021, p. 35).

The findings outlined herein provide ample evidence to support the proposed thesis that the phenomenon of dropouts and subsequent reorientation represents a continuation of the career orientation or career choice process for a significant proportion of students, even after they have obtained their HEEQ. The field of career and study orientation has seen significant expansion and promotion in recent years, with numerous school and extracurricular programmes and initiatives dedicated to its development. Study and careers guidance programmes are compulsory in all federal states, but the type and scope vary from state to state. Study and careers guidance is of lesser importance at grammar schools in comparison to other school types. An analysis of NEPS data has revealed that only 55% of pupils at grammar schools have completed an internship at the end of lower secondary level, in contrast 95% of pupils from other school types have gained experience at a company learning location (Aktionsrat Bildung, 2023, p. 117.). A study conducted in Baden-Württemberg revealed that 59% of pupils at grammar schools expressed a desire for enhanced career guidance support within educational institutions (Bächtiger et al., 2022, p. 94). A mere 28% of high school graduates reported being made aware of vocational education programmes available to them during their education (Aktionsrat Bildung, 2023, p. 186).

The wide range of study and career guidance programmes obviously only leads to a stable orientation for some of the school leavers with HZB. Among prospective university-qualified students, 63% report that they would like to study, while 23% plan to enter vocational education programmes. 14% of pupils remain undecided (Woisch et al., 2019). The data correspond with findings from the mid-2010s (Institut für Demoskopie, 2015; Schuchart et al., 2016). Studies on post-school trajectories document that a proportion of school leavers with a HZB end up on unstable subsequent paths (Michaelis et al., 2022, p. 55):

(1) 42% result in stable study programmes, 28% in unstable study programmes;

(2) 15 % lead directly, 12 % with a delay, to stable training programmes;

(3) 4 % lead to unstable careers with a high risk of unemployment.

The findings indicate that for a significant proportion of school leavers who hold a HEEQ, the decision regarding the next educational pathway is a challenge. A considerable number of indiviuals find themselves confronted with the decision of whether to take up a course of study or vocational education, or, alternatively, which of the nearly 10,000 Bachelor's degree programmes, approx. 320 dual education occupations or approx. 70 occupations within the school-based vocational system they should pursue. For many school leavers, the process of career orientation is not completed when they leave school. Rather, this process is shifted to the initial phase of studies or vocational education which leads to a significant proportion of individuals dropping out with subsequent reorientation.

1.2 Educational innovation: Study-integrated vocational education as the basis for an experience-based educational pathway decision

Study-integrated vocational education ("Studienintegrierende Ausbildung" – SiA) is an innovative educational model that combines vocational education with a university degree programme, with the aim of better addressing the situation of undecided or uncertain university entrants (Euler & Severing, 2016). The model, which extends over a period of four years, can be characterised by the following features:

- Students who are eligible to study are required to commence a dual vocational education programme, which incorporates a Bachelor's degree course in a related discipline. For instance, a commercial apprenticeship may be undertaken in conjunction with a Bachelor's degree course in business administration.

- The SiA commences with a preliminary phase, during which the vocational education and study content are integrated across the curriculum. This phase, which lasts between 12 and 18 months, depending on the vocational education programme, is designed to ensure that learners successfully complete parts of a dual education programme, in addition to subject-related study modules at a university.

- Upon completion of the preliminary phase, learners are given three subsequent options to pursue, based on the insights gained in their vocational education and studies. These options include: (1) the pursuit of a double degree from both training and studies; (2) the continuation of studies leading to a Bachelor's degree; (3) the completion of dual vocational education.

The SiA is seen as a further development of existing dual study programme formats. While vocational education remains excluded in the practice-oriented variant of the dual study programme, it is increasingly marginalised in the vocational education-integrated variant (Euler & Severing, 2016; Nickel et al., 2022; Krone & Niehoff, 2023). The performance potential of SiA lies in the following points in particular:

- Curricular dovetailing: SiA dovetails vocational education and study content in related subject domains in order to avoid repetitions within a training or study programme.

- Recognition: Suitable modules are completed during the vocational education at degree level, which are recognised by the university in the respective degree programme. Conversely, study content relevant to the vocational education programme is not repeated during the vocational education.

- Educational pathway coaching: In the process of deciding on one of the three options after the basic phase, learners can take advantage of so-called educational pathway coaching.

The core element of educational pathway coaching discussed in this article basically focusses on structuring the experience gained from the three learning venues of company, vocational school and university and reflecting on one's own goals, motives and ideas. One result of this process is the learner's decision in favour of one of the three options. This can be seen as a confirmation of previous preferences for achieving a double degree or as a rejection of this idea and a focus on a vocational education or a university degree. While the objective of educational pathway coaching is roughly clear, at least in the conceptual foundation of the SiA, its design is subject to further implementation.

The model was first implemented in Hamburg and then in North Rhine-Westphalia. The following descriptions and analyses relate to the development and implementation processes in Hamburg.

1.3 Research focus: Designing educational pathway coaching as a component of study-integrated training

The starting and reference point of the study is the implementation of the EPC in Hamburg in the period from 2020 to 2023, wherein the EPC is being implemented in five SiA programmes. These are four SiA programmes (banking clerks, industrial clerks, marketing communication clerks and IT specialists) and the business administration SME programme (business administration management of small and medium-sized enterprises). The objective of this study was to formulate concrete concepts for the implementation of the EPC for these SiA programmes, while different implementation variants were to be deliberately created and tested. The following key question formed the basis for the implementation: The central question guiding this inquiry is how the EPC (as a core component of a SiA) can be designed to support the objective of an experience-based decision on the further educational path within the basic phase of the SiA.

The development and implementation process was analysed on the basis of a "Design-Based Research (DBR)" concept. The following research questions were pursued:

- What specific goals are being pursued with the EPC? Which topics are addressed?
- Which modes of reflection are used by learners to engage with the thematic focal points?
- Which components are used to carry and sequence the EPC?
- How is the relationship between coach and coachee organised?
- How is the EPC organised in terms of personnel, time and institutions?

The following remarks document the methodological foundations of the DBR concept (Chapter 2), the development of a theoretical frame

of reference for the EPC (Chapter 3), the findings from the development and testing cycles (Chapter 4) and the scientific results in the form of design principles (Chapter 5).

2.0 Design-Based Research as a methodological foundation

The key question previously outlined serves as the basis for both the practical development and the scientific investigation of the EPC within the SiA. The still open target specification and the open development character in the design of the intervention show that conventional designs of empirical-quantitative social research are initially not applicable as a methodological basis for the investigation. It is not possible to analyse the effects of already mature support concepts within the framework of an experimental/control group design at the beginning of a development process. Accordingly, a methodological approach is selected for the scientific investigation, combining the iterative development of realisation variants of the EPC with formative evaluations and feedback of the results into the development process. The present approach is supported by the methodological framework of DBR (Design-Based Research Collective, 2003; Plomp, 2007; McKenney & Reeves, 2012; Euler, 2014; Bakker, 2019), the main features of which are first outlined below and then specified with regard to the specific context.

2.1 The concept of design-based research

DBR is characterised by the claim to interlink the development of innovative solutions for practical educational challenges with the acquisition of scientific knowledge (Euler, 2014). Plomp defines DBR as "the systematic study of designing, developing and evaluating educational interventions (such as programmes, teaching-learning strategies and materials, products and systems) as solutions for complex problems in educational practice, which also aims at advancing our knowledge about the characteristics of these interventions and the processes of designing and developing them" (Plomp, 2007, p. 13).

The research and development process in DBR is initiated in response to significant challenges encountered in educational practice within specific situational contexts. These challenges necessitate the development of innovative approaches to address them effectively. In this respect, the focus of research and development work is on the question of how a desirable goal can be best achieved in a given context through an intervention that has yet to be developed. The development of innovative problem solutions is characterised by two distinct characteristics: On the one hand, it is theory-led and is based on available scientific knowledge. On the other hand, the everyday theories of experienced practitioners that can be activated are incorporated into the development. This also demonstrates that the approach in DBR is designed as a cooperative process in which the participation of those involved in the addressed practice is explicitly provided for. In accordance with DBR, practice is not regarded as object of research; rather,

it is considered a cooperation partner. Experienced practitioners are involved in the various phases of the research and development process, which usually results in diverse approaches to the investigation of practice fields, in contrast to research where practice remains in the object role. This may have a positive effect on the quality of the practical solutions as well as on the differentiation and transferability of the findings obtained.

The research and development process at DBR takes place in iterative cycles of design, testing, (formative) evaluation and re-design. Within these cycles, the design is optimised step by step, while the development processes and principles are systematically documented. "One of the distinctive characteristics of the design experiment methodology is that the research team deepens its understanding of the phenomenon under investigation while the experiment is in progress" (Cobb et al., 2003, p. 12). The interventions should only be evaluated summatively after advanced refinement, i.e. the different development potentials of interventions are first exhausted before an approach is discarded if it is not useful (cf. Lewis et al., 2006, p. 8). The following overview outlines the basic sequence of a DBR research and development process and describes the intended outcomes for each phase of the process:

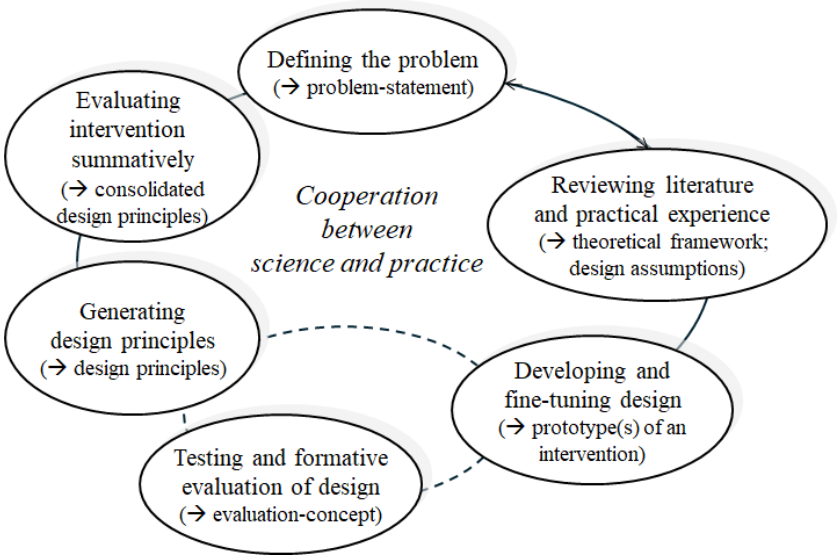

Figure 1: *DBR process model (cf. Euler, 2014)*

From a scientific perspective, the development of innovative educational concepts in and with practice is linked to the development of theories that are context-sensitive and useful for practice and that further develop the scientific findings in relation to the object of research. These theories are elaborated and identified within the research approach in the form of design principles. Theories are thus primarily representations of design principles that have been tested for a specific application context (Reeves, 2006; Euler, 2017). Design principles are understood as a generic term for guidelines for action that can be formulated at different levels of abstraction. They are the result of a generalisation process, whereas DBR follows a different understanding

of generalisation than is the case with empirical-quantitative social research approaches. While generalisation there is commonly understood in the sense of a statistical connection between a sample and the population, in DBR, generalisation is based inductively on the comparative analysis of individual cases and a justification of similarities and differences (Euler, 1994, pp. 269 f.; Kelle & Kluge, 2008). Design principles therefore go beyond the recording of a singular individual case, but remain limited in their scope of generalisation and in the degree of abstraction of the statements within the framework of the respective field of testing (Euler & Sloane, 2024).

Euler (2017) focusses on the process of developing so-called design principles. Based on a guiding research question, design principles are initially constituted as the result of an evaluation of the relevant literature and an initial exploration of the corresponding field of practice in the sense of initial design assumptions. In the course of the research process, the principles are subject to refinement and, if deemed necessary, expanded through targeted steps of testing and evaluation. In the context of DBR research practice, the question how design principles should be formulated in concrete terms remains unsolved. When formulating design principles, Euler proposes combining the description of the respective action with information about the anticipated consequences or effects, in addition to the (partial) objectives being pursued. In this way, design principles have the capacity to contribute to the structuring of a stringent goal-means argumentation.

2.2 Development, implementation and formative evaluation of educational pathway coaching within the framework of design-based research

Figure 1 describes the typical course of a DBR research and development process. This process was implemented in two cycles with different cohorts of learners in the period 2020-2023. The following table provides an overview of the central project phases:

Table 1: *Project phases of the development, testing and evaluation of educational pathway coaching*

No.	***Activities***	***Actors***	***Period***
	Basic considerations		
1	Theoretical and conceptual foundation of EPC (objectives; evaluation of relevant research literature; evaluation of relevant coaching experiences)	scientific support; coaches; support staff	10'2020 - 3'2021

2	Development of a theoretical frame of reference (see Fig. 3) Development of an EPC process model (see Fig. 4) with implementation materials	scientific support; coaches; support staff	4'2021 - 8'2021
Cycle 1			
3	Testing the EPC process model in five SiA programmes Exchange of experience in workshops	coaches; support staff scientific support; coaches	9'2021 - 6'2022
4	Analysing documents, materials SiA programme-related focus group interviews with the EPC coaches (2 interviews / year) Individual interviews with 10 SiA learners (2 / programme) from start year 2021 (2 interviews / year)	scientific support scientific support; coaches scientific support; SiA learners	9'2021 - 3'2022 11'2021 - 5'2022 9'2021 - 5'2022
5	Data analyses; preparation and documentation of interim findings	scientific support	4'2021 - 7'2022
6	Review workshop; validation of interim findings Adaptation of concepts, EPC process model, implementation materials	scientific support; coaches; support staff	8'2022 9'2022 - 11'2022
Cycle 2			
7	Testing the (revised) EPC process model in five SiA programmes Exchange of experience in workshops	coaches; support staff scientific support; coaches	11'2022 - 6'2023

8	Analysing documents, materials SiA programme-related focus group interviews with the EPC coaches (2 interviews / year) Individual interviews with 10 SiA learners (2 / programme) from start year 2021 (2 interviews / year) Individual interviews with 5 SiA learners from start year 2022	scientific support scientific support; coaches scientific support; SiA learners (same as previous year) scientific support; SiA learners	11'2022 - 3'2023 11'2022 - 5'2023 9'2022 - 5'2023 2'2023 - 3'2023
9	Data analyses; preparation and documentation of interim findings	scientific support	4'2022 - 9'2023
10	Review workshop; validation of the findings	scientific support; coaches; support staff	11'2023

In the case of the EPC, the development and research process outlined in Figure 1 is intended to lead to practically tested concepts for the implementation of an EPC within the framework of the specific SiA programmes in Hamburg as well as to design principles.

The process model was initially used in the implementation of the SiA in Hamburg to determine the roles of science and practice: Teachers from the vocational schools involved in the implementation of the SiA in Hamburg participated in the development as representatives of educational practice. The number of teachers selected for each SiA programme ranged from three to five, depending on the number of learners. The teachers already had coaching experience from other thematic areas (e.g. learning coaching, career guidance, study counselling) and their primary function was to serve as future coaches responsible for the implementation of the EPC in their schools. The majority of these individuals had completed a coaching qualification, with different specialisations, in addition to their pedagogical training. The selection decision was based on two factors: Firstly, the teachers at the vocational schools are familiar with the SiA concept. Secondly, they should be responsible for transferring the EPC to regular operations following the development and trial phase. In this context, they should also act as mentors for the introduction of further coaches at their schools.

The coaches were prepared through a series of development and exchange workshops, commencing prior to the start of the trial phase and continued until the end of the second cycle in 2024. Initially, the workshops were held on a bi-monthly-basis; from the second trial year onwards, the coaches met every four months. The employees were available for the preparation and organisation of the workshops and

also provided support for the design of materials for the coaching activities. The academic support team participated in the workshop, utilising them for the collection of data, among other purposes. For the coaches, the workshops formed an essential basis for preparing their EPC activities. Drawing on their experiences in other coaching contexts, they were able to consolidate their understanding of EPC in the workshops, plan suitable implementation variants and exchange initial trial experiences.

The implementation of the EPC between and within the SiA programmes was achieved at a comparable level of competence, facilitated by the continuous exchange that occurred before and during the trial phase. Within the confines of this homogeneous framework, the coaches were at liberty to experiment with a variety of implementation variants as part of an open development process.

In accordance with the aforementioned framework, the academic support team was entrusted with the responsibility of establishing the conceptual foundation of the EPC, conducting the formative evaluation, and providing feedback and discussion on the findings derived from educational practice.

The process model was also used to structure the individual research and development phases. Specifically, the following procedure was followed:

Specifying the problem:

The research and development process initially focussed on specifying the problem. Based on the key question (see Chapter 1.3), the teachers and future coaches were asked to specify the objectives of the EPC. Which steps are sensible and necessary in order to be able to make an experience-based decision about the further educational path? To what extent is it possible to reflect more fundamentally and comprehensively on individual goals and perspectives with the learners in this context?

In contrast, the scientific support centred on concretising the knowledge objectives. Which aspects of the EPC process should be prioritised in the evaluation (e.g. objectives, procedure, prerequisites of the EPC; critical events; assessments by the learners and/or the coaches)?

Analysing literature and experience:

The development of the prototype and the SiA programme-specific EPC concepts was theory-based. The conceptual and theoretical foundations underpinning this study are drawn from two distinct sources. In addition to the evaluation of relevant scientific sources and empirical findings (see Chapter 3) by the scientific support team, the experiential knowledge of the participating teachers was tapped. The involvement of practitioners was based on the assumption that they possess extensive (experiential) knowledge of coaching from other contexts and thus also experiences of the critical events that can occur when applying a developed coaching concept. The development of the EPC as a new, innovative concept in the SiA could not yet be based on specific theoretical or practical experience. As a result, the findings obtained from the two sources were merely initial approaches to the concretisation of essential design tasks.

Developing (or refining) the design:

Following a comprehensive analysis of the relevant literature and experiential sources, the initial prototype for testing the EPC was developed by the future coaches, initially as a group, for the first cohort of SiA learners. For the concept development, different dimensions and questions had to be taken into account, which the group of developers dealt with, drawing on both theoretical references and empirical knowledge. The prototype developed in this manner organises the EPC into three phases (see Chapter 3). This prototype provided the initial basis for the detailed planning of the EPC. Prior to the implemention of the EPC in the five SiA programmes, the coaches from the respective programmes concretised the jointly developed prototype for the specific SiA programme, taking into account the respective target group and specific contextual factors at the respective vocational schools. Consequently, the concrete design of the EPC varied between the five SiA programmes.

Testing and formatively evaluating the design:

The concepts developed were then trialled by the teachers involved in the development process, who acted as coaches during implementation. The formative evaluation was conducted by the academic support team, who collected the data using various methods from different perspectives. The data were collected using the following methodological approaches:

- Analysing documentations and protocols that were created in connection with the development of the EPC concept and its implementation in the SiA programmes. In addition to documents from the development phase, observation protocols were also compiled. A total of ten observation protocols from the introductory events are available from the two trial cycles. These include the course of the introductory event as well as the observers' assessments of the achievement of objectives, the activities of the learners and the methodological approach in the introductory event.

- Conducting guided focus group interviews with the EPC coaches. A total of ten focus group interviews were conducted with the EPC coaches in the two test cycles, two interviews per programme. The focus group interviews were conducted separately for each programme at two different times. The first interview took place in June 2022 and the second interview in June 2023. The guidelines for the two interviews provided for phases in which information was requested, implementation experiences, perceptions and judgements were surveyed, open questions were explored and suggestions for possible alternative courses of action were obtained. The interviews lasted between 120 and 160 minutes.

- Conducting semi-structured individual interviews with SiA learners from the first year (start 2021), who were interviewed at different times over the entire SiA period by the academic support team. A total of ten learners (two from each SiA programme) were followed over the course of the SiA and interviewed twice a year on different thematic focal points of the SiA. The perceptions, experiences and assessments of the EPC from the perspective of the learners were one of the thematic focuses of the first three interviews conducted with the

learners by the academic support team in spring 2022, autumn 2022 and spring 2023.

- Conducting five guided focus group interviews with SiA learners from the five SiA programmes from the second year (start 2022). These interviews focussed solely on the learners' experiences with the EPC as well as their perceptions, assessments and suggestions for improvement.

The presentation of the findings (see Chapter 4) refers to the data from the interviews with the coaches and the SiA learners. The objective of the interviews was to document the subjective interpretations of reality concerning the EPC from multiple perspectives (thematic focussing). The interviews were each based on a guideline by which the perceptions and assessments of the EPC and individual elements of the EPC were thematised (guideline-structured). It was essential that the interviewees were capable of responding to the openly formulated guiding questions with ease and autonomy, and without being influenced by the interviewers. This enabled them to develop the aspects relevant to them (communication of subjective relevance systems).

Examples of the key questions can be found in Table 2 below:

Table 2: *Excerpts from the interview guidelines*

Interviewee	Sample questions from the guidelines
Learners	• What significance does educational pathway coaching have for you in your SiA? • How have you perceived the educational pathway coaching so far? • What do you gain from coaching? • What are you missing? What do you think is good? What could be better? • How did you experience the introductory event? What significance does it have in the context of educational pathway coaching? • How did you experience your first coaching session as part of the educational pathway coaching programme? • Have you had any further experiences with educational coaching since our last conversation?
Coaches	• How do you rate the individual elements of educational pathway coaching and their sequencing? • Would you stick to the introductory event in the future and what function does it fulfil in the overall coaching process? • What expectations / goals did you pursue with the use of the reflection impulses? • Was there a general structure for the coaching conversations or did this develop individually depending on the conversation? Outline the course of the discussions. • What challenges have you realised in your role as a coach? • What have you gained from your initial experiences for the further organisation / progress of the coaching?

During the interviews, the interviewers were at liberty to adapt to the respective communication situation with the interviewee despite the

guidelines. They were not rigidly bound to the order and type of questions from the guidelines, but were able to adapt them according to the interview situation. For example, they could decide to omit, bring forward or reformulate one or other questions according to the situation (flexibility in the use of the guidelines) (cf. König, 2005, pp. 83 ff.).

All interviews were recorded by the scientific support and subsequently transcribed in full. In order to analyse the interview data, the method of structuring content analysis was used in combination with summarising content analysis (cf. Mayring, 2022). The initial phase of the research involved the application of Mayring's content analysis methodology to the thematic structuring of the interview material. The categories used for the analysis were derived from the frame of reference and the individual components of the EPC, e.g. objectives of the EPC, individual benefits of the EPC, reflection impulses, coaching discussions (cf. Chapter 3). At the same time, it was possible to expand and/or differentiate the deductively developed category system through inductively generated categories. The scope of the assigned text excerpts was based on the fact that the statements contained should also be understandable independently of the text context. During the analysis of the first interview, so-called memos were created for each category and subcategory, in which notes on the coding of the material were documented. A memorandum was thus formulated for each category, encompassing two components: firstly, a detailed documentation of the recorded information pertinent to the category, and secondly, the provision of an illustrative exemplar to serve as a point of reference.

Example from the analysis of the interviews with the SiA learners on the category "Reflection impulses":

What does this category cover?

- Statements about perceptions of the reflection impulses
- Statements on the use of reflection impulses
- Statements on the benefits of the reflection impulses
- Statements that provide information about the educational pathway coaching process

Anchor example:

"To be honest, not much has got through to me yet. I've noticed that there are impulses and reflection tasks, and I think that's quite good. But as I said, I honestly haven't dealt with it that much yet, because there are simply so many other topics at the moment" (I1-S3-HH, pos. 85).

Once all interview transcripts had been thematically structured using the category system, the content was summarised to reduce the material. In the course of the analysis, the results of the individual categories from the different approaches and perspectives were put in relation to each other.

Generating design principles:

The results of the formative evaluation were analysed by the scientific support team and used as a basis to identify discussion points for the further development of the EPC. The findings and discussion points

were communicated to the coaches in workshops, in accordance with the DBR concept, and starting points for further development were generated on this basis. Subsequent to the workshop, the coaches were tasked with making various modifications to the programme-specific EPC concepts for the initial testing cycle, which in turn were formatively evaluated by the academic support team as part of the second cycle.

As a substrate of the evaluations, the scientific support generated design principles in the form of guidelines for the development of an EPC in SiA programmes with the aim of gaining theoretical insights.

3.0 Development of a theoretical frame of reference

Due to the original character of a SiA, an EPC within this newly developed educational concept lacks both specific theoretical foundations and empirical references on which the design of an EPC could be based. Nevertheless, there are coaching approaches from other contexts (e.g. vocational and study orientation, career counselling) with theoretical underpinnings (see Hirschi & Läge, 2008; Sauer-Schiffer, 2010; Hirschi et al, 2011; Foley & Bergquist, 2013; Kauffeld & Gessnitzer, 2018; Kauffeld & Wittner, 2023), which can be taken up as impulses for the development of a theoretical frame of reference. The following frame of reference for analysing and designing the EPC was generated as a substrate of the literature analysis and the comparative evaluation of practical experience:

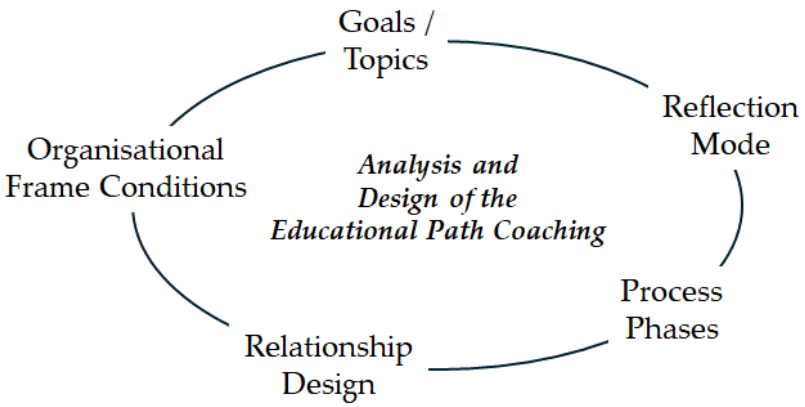

Figure 2: *Frame of reference as a basis for analysing and designing the EPC*

The components of the frame of reference form the categories on the basis of which the developments in the SiA programmes are recorded and comparatively analysed in line with the DBR concept (cf. Chapter 2).

Goals and topics

The goal of related coaching and counselling concepts (e.g. in the context of career and study orientation) is the development of career

choice competence or "professional sovereignty". "Vocational sovereignty is defined as a person's ability and competence to choose and practise their profession in a self-determined manner" (Aktionsrat Bildung, 2023, p. 55). This definition aligns with the understanding of career choice competence as a multidimensional construct, comprising "cognitive abilities, motivational orientations and action skills" (Driesel-Lange et al, 2020, p. 59), while various models from career choice research emphasise the following prerequisites for self-determined career development in a dynamic environment: (1) self-knowledge, in particular knowledge of personal values and goals; (2) knowledge of the labour market and the professional world; (3) process skills for planning, exploration, decision-making and implementation; (4) metacognitions such as self-confidence, self-efficacy expectations or a positive self-concept (Hirschi, 2013; Driesel-Lange et al., 2020, p. 60).

Within this range of options, a basic configuration comes into fruition that can be described as constitutive for coaching approaches: Person and situation, individual goals, resources and demands are to be harmonised with external (social) requirements – in the case of the SiA with the demands of training and studies. In this context, the clarification of one of the two sides can be problematic in the coaching process, but it is important to note that personal demands or the situational requirements do not become the sole decision regulator.

These still abstract terms must be interpreted in relation to the specific requirements of a SiA, wherein learners have initially opted for an educational pathway, but retain the capacity to reflect on the options for its further course. The objectives of the EPC were initially derived from its function within the SiA: Learners were expected to reflect on their experiences from vocational education and study and use this as a basis for making a decision about how they wanted to organise their further educational path. In terms of related coaching approaches, the following objective, which is at this stage somewhat provisional, can be realised in the following manner: Based on the experiences and lessons learnt from the SiA learning venues, the EPC should contribute to the learners'

- reflect on their experiences during their vocational education and studies,
- become aware of their own goals, potential and areas for development,
- become aware of the specific requirements, expectations, tasks etc. at the company, vocational school and university learning venues and deal with these in a critical and constructive manner,
- compare their individual requirements with the external requirements and make a decision about their future educational path on this basis,
- recognise that through the EPC they develop strategies and become familiar with procedures that enable them to make targeted decisions about their educational path in situations of uncertainty in the future.

Some of the objectives are also linked to initial information about the topics of the EPC.

The subjective experience of the SiA in the three learning locations forms the centre of the EPC. In this regard, the EPC should facilitate opportunities for learners to process and reflect on their experiences in the company, at the vocational school and at the university, and also encourage them to relate the different worlds of experience in the company, vocational school and university to each other.

Based on this claim, a development phase model was used for the further elaboration of the prototypes, in which the experience of the basic phase of SiA is modelled through different transitions (cf. Euler & Naeve-Stoß, 2020). Learners have to master different transitions in the SiA: Diachronic transitions result from the fact that educational pathways are completed in biographical stages. This process commences in childhood, continues through the stages of general schooling and culminates in the transition to a SiA. In this stage, the learners are in the basic phase, in which they are able to determine the desired completion of the SiA, but in principle can also consider a reorientation or the stages of the further educational path. The EPC primarily supports learners in their decision-making process. In this process, experiences from previous development phases can also be utilised, particularly if the EPC is concerned with self-reflection and the articulation of individual goals, motives, interests and ideas concerning one's future which are then contextualised within the current circumstances. In the sense of Marotzki (1990), a diachronic mode of reflection is pursued in which learners are encouraged to become aware of their own history.

A second form of transitions, termed as synchronous transitions, arises from the fact that experience is acquired in three places of learning in the SiA. Consequently, different requirements from the places of learning must be harmonised with each other. For learners, the parallelism of different learning locations can manifest itself as a "transition problem" (cf. Meyer-Guckel et al., 2015). The transition between the various spaces of experience, characterised with their distinct logics and practices of action, between the different requirements and between the different teaching, learning and examination cultures can present learners with specific challenges. Against this background, one object of the EPC could be to reflect on the experiences at the three learning locations, their differences, and their interaction in the SiA. The EPC affords learners the opportunity to reflect on their respective experiences with regard to their own goals, motives, potential and ideas about their educational path.

Reflection mode

Reflecting on experiences and adventures plays a key role in the coaching concept (Greif, 2008; Wiemer, 2012; Boos et al., 2020; Hajinejad et al., 2021). An important target perspective of reflection in the context of educational and career path coaching is to address questions about one's own ideas, (future) perspectives, strengths and professional orientations based on experiences in the three learning venues. Through "individual self-reflection", which is a conscious process "in which a person thinks through and explicates their ideas or actions that relate to their real and ideal self-concept" (Greif, 2008, p. 40), learners can be encouraged to draw conclusions for future actions.

In view of the target perspectives of the EPC, it is important to aim for a certain breadth of reflection as well as a certain level or depth so that reflection can make a beneficial contribution to clarifying the further educational path. Following Leonhard et al. (2010), the breadth of reflection refers to the various dimensions that are included by the reflective person when becoming aware of a situation to be reflected upon. In the context of EPC, this can include aspects of personality, interaction with people from one of the learning locations, directly influencing contexts, institutional factors or expectations of the social environment such as peers, parents or other relevant reference persons. The depth of reflection illustrates the complexity of reflection. In their model, Smith & Hatton (1995) describe different levels that reflect the complexity of reflection. They distinguish between four different levels of reflection:

- "descriptive writing": description of a situation, experience or event;
- "descriptive reflection": search for possible causes or reasons for the situation or experience;
- "dialogic reflection": linking possible causes or reasons by evaluating the pros and cons;
- "critical reflection": inclusion of implications and consequences as well as justification of possible approaches for further action, if necessary with reference to own goals.

Process phases

In addition to these design fields, it was necessary to transfer the considerations in the first two dimensions into a phase concept with individual components and to sequence these sensibly throughout the basic phase so that the learners can make a decision about their further educational path (at the latest) at the end of the basic phase.

The result of this process is a prototype that phases the EPC over a period of 12-18 months and contains three key components:

- An introductory event in which the learners get to know the EPC programme, its objectives and the process. The introductory event takes place approximately three months after the start of the SiA, after the learners have familiarised themselves with all three learning locations. The introductory event is held by the coaches at the respective vocational school for the group of SiA learners from the respective SiA programme and comprises two to six lessons, depending on the EPC concept in the SiA programme.
- Reflection impulses to stimulate and structure learners' reflections on their experiences in the SiA. The reflection impulses are intended to deepen the learners' reflection processes on their vocational education and study experiences between the face-to-face meetings with the coaches. The process is voluntary for the learners. In addition to the intended reflection on the experiences in the learning venues, the reflection impulses are also used, among other things, to prepare for the coaching discussions. The reflection impulses were generally structured using relatively open guiding questions. One example is the reflection impulse "interim assessment", with which the

learners are asked to reconstruct and document their positive experiences and successes as well as the challenges they experienced and how they overcame them with reference to the past six months.

- Individual coaching sessions in which learners, accompanied by a coach, reflect on their development, experiences and potential and are encouraged to shape their further educational path in a targeted manner. During the basic phase of the SiA, two coaching sessions are held with each learner.

Figure 3 below provides an overview of the phases and the respective components.

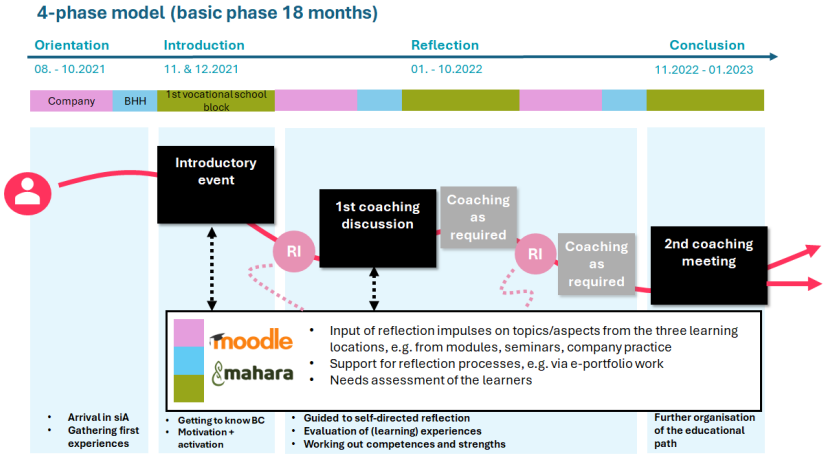

Figure 3: *Components and process of the EPC (Hanns et al., 2021)*

Shaping relationships

An overarching factor for the success of the EPC is the establishment and design of a relationship level between coach and coachee (Schuchardt-Hain, 2017). This is linked to the question of who acts as a coach for the learner and what competence profile he/she should have. In principle, coaches can be recruited from vocational schools, universities and companies or externally. One aspect of the choice could be a possible conflict of roles, i.e. if a coach simultaneously acts as an (assessing) teacher or as a supervisor in the company, for example, this can prevent the necessary building of trust. In addition to the question of the selection of the coach, it must be clarified which formats and activities can be used to build a trusting relationship at an early stage in the SiA.

Organisational framework conditions

Finally, in addition to personnel, time, financial and institutional resources are relevant framework conditions for the implementation of the EPC. Time resources can be limited both on the part of the coaches and the coachees. From this perspective, it is therefore also important to define the objectives and topics of the EPC and to delegate any further needs on the part of the coachees (e.g. learning coaching, psychosocial counselling) to the appropriate bodies as part of a referral counselling. Financial and institutional resources refer to the question to what extent the EPC is understood to be in line with the objectives of

the individual learning venues and should therefore be integrated into the institutional profile of the learning venue.

4.0 Findings from the development and testing processes

In accordance with the research questions that guided the findings (see Chapter 1), the scientific support organised the individual steps of the study on the basis of DBR (see Chapter 2). On the one hand, the frame of reference (Chapter 3) structured the practical design interest to specify the EPC in terms of its objectives and to develop its design components within the SiA in a differentiated manner. On the other hand, the frame of reference forms a structuring basis for gaining and documenting the knowledge derived from the two development and testing cycles, manifesting as design principles.

Goals and topics of the EPC

At the beginning of the initial trial cycle, the objectives of the EPC were not clearly defined for either the coaches or the learners. Following the introductory event, the learners interviewed were mostly only able to give a rough, undifferentiated understanding of the objective and function of the EPC. In certain instances, the EPC was linked to study counselling or interpreted as a component of vocational school education. It was contended by a number of coaches that a focus of the process on the decision in favour of one of the educational options was too narrow. They saw it as essential to incorporate the learner's biographical and personal background as well as their social context into the coaching programme.

In the first cycle, approx. 100 learners participated in the five SiA programmes. On the one hand, it became evident that the necessity for support differed in terms of both subject matter and motivation. On the other hand, it became clear that the willingness to open up as a person and reflect on personal experiences and adventures varied.

Based on the experiences from the first cycle, the objectives of the EPC were refined through consultation with the coaches and subsequently disseminated at the introductory event. The following three target areas constituted the focal point of the SiA programmes, with varying emphases applied to each:

- reflection on the educational path to date with the identification of challenges, strengths and available support resources;
- dealing with personal and emotional facets of one's own person;
- decision or clarification of the option "double degree vs. focussing on the training qualification".

The reflection processes within the EPC are based on the learners' existing reflective competences. In this light, corresponding processes

may remain superficial if these competences are not sufficiently developed. In view of the limited time available for the EPC, the originally stated goal of further developing and strengthening the learners' reflective competences was considered too demanding and was removed from the list of objectives.

For the majority of learners, the option of determining the desired qualification is not of major significance. Almost all learners in the first year express the double degree as a goal. They emphasise that the focus is not on 'whether' but on 'how' (which at least indicates that achieving the double qualification is not perceived as a foregone conclusion). Concurrently, individual learners have indicated a perceived necessity for guidance from their peers regarding the decision option.

The range of topics in the EPC is wide. The preceding educational path, the perceived strengths and the current state of mind in the SiA learning locations are frequently discussed. One topic in this context is dealing with different rules and practices in the learning locations (e.g. the strong regulation of compulsory attendance, restrictions on mobile phone usage at the vocational school learning location) or the perceived role of the individual as a pupil, student or employee in the company. The level of demands, challenges and didactic practice in the learning locations can also be discussed. Learners include their own person, for example in connection with organisational topics (e.g. coordinating examination dates, balancing workloads) or references to personal challenges (e.g. learning behaviour, time management).

Reflection mode

The tenor of the exchange is factual, with emotional dimensions remaining in the background. The learners describe their situation in a controlled manner, and existing challenges are generally described as manageable. Focus group interviews with the coaches have revealed that, in terms of the depth of reflection, the behaviour described by Smith & Hatton (1995) as "descriptive writing" is prevalent among many learners, in which situations and experiences are described but not questioned or evaluated as to their (background) reasons. From the two test cycles, the impression emerges that promoting the further development of learners' existing reflective competences within the given time frame would result in the concept being overstretched. In this regard, the promotion of this area of competence should be integrated into training and studies beyond the EPC.

Phases of the EPC process

While the first trial cycle largely followed a linear sequence of phases with an introductory event, reflection impulses and coaching discussions, the second cycle saw modifications to the introductory event on

the one hand and shifts in the use of the reflection impulses on the other.

Introductory event

The introductory event for the EPC took place around three to four months after the start of the programme in both the first and second trial cycles. The timing was chosen because the learners had already familiarised themselves with all three learning venues by this time and the information and work density from the initial phase had eased somewhat. The implementation followed a series of overarching principles:

- voluntary participation in the tasks and exercises,
- freedom of assessment for the learners' contributions,
- confidentiality of contributions with regard to disclosure to the outside world,
- striving for depth and intensity of reflection,
- as comprehensive as possible self-assignment of the learners to the coaches.

In the initial cycle, the majority of SiA programmes placed significant emphasis on reflecting on the educational path to date, personal goals, strengths and challenges. For example, reflection exercises were carried out, work assignments were given and reflection results were developed and reflected upon in a workshop format with the help of various media (including metaplan boards, flip charts, picture cards). The individual interviews with the learners indicate that they rated the overall concept of the introductory event as good, although in one programme individual learners expected "more content" or questioned the mandatory participation overall. Other learners rated the event as positive overall; objections related to its length and the remaining lack of clarity about the objectives of the EPC. The coaches were generally positive about the learners' participation, although they recognised limits to the depth of reflection that could be achieved within the given framework (e.g. number of participants, school environment). In the second cycle – even after the question of the precise objectives of the EPC was discussed in the workshop of coaches and academic support after the first evaluation cycle – a stronger focus was placed on the presentation of the EPC objectives and on establishing contact with the coaches. Following the conclusion of the event, individual coaches made contact with the learners assigned to them with a view to fostering a stronger relationship. Considerations to develop reflection skills in the introductory event were not pursued further.

Impulses for reflection

Reflection impulses were offered in four SiA programmes, in the fifth SiA programme they were integrated into the coaching discussions. In

some cases, they were handed out at the end of the introductory event; otherwise they were sent via a platform or by email.

The realisation of the reflection impulses by the learners in the first cycle can be inferred indirectly from the perception of the coaches and from the interviews with the learners. In the interviews with the learners, the reflection impulses are not mentioned at first; when explicitly asked about the impulses, they can only remember them sporadically and extremely vaguely. It becomes clear that the impulses for reflection were often perceived as work assignments. The coaches report a rather sluggish response overall. The depth and quality of the processing are assessed as very different. The question of whether the absence of depth in reflection is attributable to a lack of willingness or a lack of competence on the part of the learners remains to be resolved. It is evident that, particularly during periods of heightened workloads, academic demands, and examination pressures, individuals experience a decline in the frequency with which they engage in introspection and self-evaluation. It has been observed that learners typically address their own concerns or additional discussion needs via the reflection impulses in exceptional cases.

The experience gained from the implementation led to significant adjustments in the second cycle. In three SiA programmes, the coaches explicitly refrained from making offers to learners designated as reflection impulses between the introductory event and the first coaching discussion. In a fourth programme, a similar change is planned for the third trial cycle. The rationale underpinning the decision to eliminate explicit reflection impulses can be attributed to two key factors. Firstly, it has been observed that learners tend to interpret these impulses less as a trigger for introspection regarding their personal experiences and actions. Instead, they predominantly perceive them as a task to be fulfilled. Secondly, the reflection impulses directed towards cognitive processing were judged to be less apt for preparing the exchange concerning personal and emotional sensitivities aimed for in the coaching discussions.

In the second cycle, alternative forms of triggering reflection were introduced in place of those explicitly designated as reflection impulses:

- In three SiA programmes, coaches draw attention to the upcoming coaching session in writing or during a short class visit and encourage learners to become aware of their own concerns and bring them into the discussion.

- In one programme, strong associative images are offered before the coaching discussions, from which the learners can choose the one that they see as having a connection to their own person or their experience in the SiA.

- Specific reflection impulses are integrated into the design of the coaching dialogue depending on the situation.

- In some SiA programmes, learners are offered individualised reflection impulses after the first coaching interview, which relate to individual aspects of the interview and can provide them with further suggestions.

- In two programmes, consideration is also being given to the extent to which it makes sense to link the EPC with selected content from individual vocational or higher education modules. This would avoid compromising the non-assessment character of the EPC or giving learners the impression that the EPC is about completing work assignments.

Coaching sessions

The coaching session forms the centrepiece of the EPC. In many cases, it is a status discussion, wherein the experiences garnered from the three learning locations are reflected upon, the individual objectives of the learners are made transparent and possible challenges to achieving them and ways of overcoming the challenges are identified. The decision or reassurance regarding the individual educational pathway is the consequence of this process or, for many learners, is not the result but the initiation of the dialogue.

The first session is scheduled to take place approx. 9-10 months after the commencement of the SiA programme in four programmes and approx. 4-5 months after the start of the SiA programme in one programme. The main reason cited by the coaches in four programmes for the later date is the experience required for the interview. The second coaching interview takes place 12-15 months after the start of the programme. In the first two trial cycles, the coaches made the conscious decision to make participation in the coaching interviews mandatory for the learners. The coaches offer a justification for this by arguing that many learners only realise the individual added value and the meaningfulness of the EPC through the experience of the discussion. Furthermore, there is a possibility that the perception of a voluntary coaching interview could be regarded as stigmatising by the learners. With regard to the second coaching interview, a number of coaches have expressed the opinion that this should no longer be mandatory after the conclusion of the second cycle. Nevertheless, all coaches are keen to maintain the mandatory status of the initial interview.

As demonstrated by the interviews with the learners, it is evident that while many of the participants have been able to come to terms with the mandatory nature of the programme, with some even expressing active support for it, a considerable number of individuals obviously also have expressed difficulties with this regulation. Some refer to contact persons whom they can fall back on, especially in the company context, in the event of questions and problems that arise and also prefer to do so. Some learners, it has been observed, associate the coaching interview more with an examination situation than a support

situation. The question of the obligatory nature of coaching is controversially discussed among the learners. Furthermore, it is also linked to the role balancing act in which the learners find themselves: On the one hand, students have a high degree of self-determination with regard to their participation in the university's study programmes. On the other hand, as apprentices, they are bound by the regulations of the vocational school. Possible regulations to address the tension between obligation and voluntariness are still under discussion.

In addition to the occasionally critical stance adopted by the learners with regard to the compulsory nature of the coaching session, the majority of learners consider the coaching session to be "useful", "positive in principle" and "pleasant". Most learners welcome the opportunity to engage in such a discourse, even without addressing their own concerns in the discussion.

Shaping relationships

The more the learner's person becomes the subject of reflection within the EPC, the greater the need for an early, trusting relationship to be established between coaches and SiA learners. Furthermore, the openness of SiA learners to engage in such reflection with a coach is also of significance. Even if the willingness of the SiA learners to do so varies, the coaches believe that this goal is well achieved for the majority of learners.

The coaches utilise the introductory event and the period preceding the initial coaching session to build a relationship. On the one hand, they try to promote confidentiality and trust during the introductory event by creating a pleasant atmosphere and a culture of open communication. In the SiA programmes involving multiple coaches, the selection of the coach is also delegated to the learners. After the event, individual coaches approach the learners assigned to them, thereby creating an opportunity for them to get to know each other personally.

On the other hand, there are various aspects of the structure and process of the EPC that can hinder the development of a trusting relationship:

- The learners have not understood or do not agree with the objectives of the EPC.
- The relevant coach also acts as a teacher in the SiA programme and is not perceived by the learners as a neutral, non-judgemental person.
- The compulsory nature of the EPC leads to an attitude of completion without inner involvement in the case of learners who reject it.

Organisational framework conditions

From a personnel perspective, the coaches brought varying degrees of coaching experience to the table. As the EPC is a completely new concept, none of them already had any specific experience in this coaching segment. Nonetheless, the majority of the coaches have many years of experience from other counselling and coaching functions (including learning coaching, career guidance, student counselling). In order to select future coaches, it appears to be essential to establish which competence requirements are (or should be) placed on educational pathway coaches. A pivotal parameter in determining the requirements profile is the extent to which personal and emotional dimensions are also required within the EPC in the overall group of learners. The following areas can be identified as core requirements for the competence profile, in light of the trials conducted to date:

- A coaching attitude of non-judgemental engagement with the concerns and requirements of the learner – an attitude that differs at least in part from that of a teacher.

- Dealing with confidentiality, especially when dilemma situations arise. For example, the contact may reveal facts that, in extreme cases, indicate unlawful behaviour by learners or third parties.

- Competences of addressee-centred conversation in order to activate the learners' concerns as much as possible.

In the first trial cycle, three different role constellations emerged with regard to the coaches' connection:

- One coach acted in a multi-role relationship with the learners (as teacher, programme director, educational pathway coach).

- Three coaches acted in a dual role towards the learners (as teacher and educational pathway coach), while a distinction was still made in the extent to which the subject was assessed by the learners as 'significant' for educational success.

- Four coaches acted solely in the role of educational pathway coach towards the learners.

Dual or multiple roles are generally viewed as problematic. Despite the efforts of the respective coaches to promote transparency towards the learners, this role clarification did not prevent individual learners from assessing the multiple roles as problematic.

In terms of time resources, the coaches' budget was, in effect, constrained to the organisation of the introductory event and the delivery of coaching sessions. The time volume creates and limits the framework for the scope and intensity of the exchange between coaches and learners. In addition to the allocation of time (and the subsequent financial) budgets, the obligatory nature of the coaching sessions could influence the utilisation of time resources as a potential parameter for possible adjustments.

From an institutional perspective, the primary responsibility in the two trial cycles lay with the participating vocational schools in four programmes and with the university in one programme. The viability of both realisation options was demonstrated in principle. The 'neutral' character of this learning venue is indicative of the vocational school's ability to offer a double qualification, as opposed to the training qualification. It is important to note that neither option would have any impact on the number of students at the vocational school. However, should the second option be selected, there would be a consequential loss of students for the university. A further argument in favour of the vocational school is the experience base of the coaches: They possess knowledge of the training and study sides from their own educational and professional biographies, which cannot be assumed for teachers from the university. This assertion is countered by the argument that the scheduling of introductory events and coaching sessions could be constrained by the availability of coaches due to school holidays. The idea of including representatives from companies or external individuals into the pool of coaches has the potential to expand the range of perspectives.

The EPC is not merely a developmental process for the learner, but also for the coaches. It is evident that existing competences for the EPC develop further with experience. Against this background, it would be necessary to clarify from an institutional perspective how such a competence development process can be facilitated. One such format would be the development/quality workshops organised to accompany the trial cycles.

As a result, experience suggests that ownership of the design of the EPC should be firmly anchored in a vocational or higher education programme. Furthermore, responsibility for continuous further development and exchange between coaches should be created.

5.0 Design principles

In Chapter 2, the "Design-Based Research" concept was identified as the methodological foundation of the scientific support. This combines the development of innovative educational concepts in and with practice with the development of theories, which are worked out and identified within the research approach in the form of design principles.

The design principles outlined below constitute the outcome of this theoretical development following the evaluation of two development and testing cycles. These findings extend the observations detailed in Chapter 4, which spans a two-year period.

Targeting and reflection mode

1. Learners should be informed at an early stage about the aim and procedure of the EPC (also in differentiation from other support provisions in the learning locations).

2. The EPC should focus on reflecting on the experiences in the first 12-18 months of the SiA. The focus here is on harmonising the learner's individual requirements with social demands. One result of the reflection process is to reassure the learner about the further educational path until the completion of the SiA.

3. In the EPC phases, a pronounced depth of reflection should be sought in dialogue with the learners.

4. In the course of the EPC, it should be recognised as early as possible which learners indicate a need for support.

5. Learners with an articulated or recognisable need for support, with articulated or recognisable doubts about the progress of the SiA or the motivation to leave the SiA should be able to make use of support within the framework of the EPC as early as possible.

Process phases

Introductory event

1. The goals and focal points of the introductory event should correspond to the overarching goals of the EPC.

2. A key objective of the introductory event should be to present the objectives and processes of the EPC.

3. A further aim of the introductory event should be to initiate reflection by the learners on their educational path with the involvement of the SiA.

4. The implementation of the introductory event should in particular follow principles such as voluntary participation in the tasks, freedom from evaluation of contributions, confidentiality and self-assignment of the learners to the coaches.

5. The timing of the introductory event should be as close as possible to the start of the programme.

6. The introductory event should be linked to prompt follow-up steps in the EPC process.

Impulses for reflection

1. Reflection impulses should be designed in such a way that they are not perceived and taken up by the learners as work or learning assignments.

2. Reflection impulses should not be transmitted at times when learners are exposed to above-average work/examination loads.

3. The transmission of reflection impulses should preferably take the form of an individualised approach to the learner. The personal benefit or added value of a process can be emphasised.

4. Reflection impulses should (at the latest after the first coaching session) be as individualised as possible to the learner's needs.

5. Reflection impulses should particularly focus on thinking about and anticipating issues that have been identified as challenging in coaching discussions with learners (e.g. high workload, time management).

Coaching sessions

1. The added value and usefulness of an individual coaching session should be explained to learners in advance.

2. Learners with a justified refusal of a coaching interview should not be obliged to attend an interview.

3. The topics and process of the coaching session should be aligned with the EPC's objectives.

4. The concerns raised by the learners should be prioritised for discussion.

5. The topics and concerns introduced by the learners should be differentiated as to which belong to the core of an EPC and which should be dealt with in the context of referral counselling.

6. Critical comments from the coaching sessions should be documented and, if necessary, fed into the relevant SiA committees in anonymised form. The focus here is not on the individual clarification of a problem situation, but on reflecting on whether such criticism points to structural deficits in the learning venues need to be remedied.

7. If there are recognisable tendencies on the part of a learner to end the course of study or the SiA programme, he/she should be offered in-depth or more intensive forms of discussion.

Shaping relationships

1. The coaches should introduce themselves to the SiA learners assigned to them after the introductory event at the latest and endeavour to establish personal contact.

2. Role constellations that can impair a trusting relationship with the learners should be avoided.

Organisational framework conditions

1. The following areas of expertise should be taken into account when recruiting educational pathway coaches: Coaching attitude of non-judgemental engagement with learners; dealing with confidentiality; addressee-centred dialogue.

2. The financial and time resources should be focussed as much as possible on learners with a need for support and/or clarification.

3. The EPC should be organised and managed at the level of an educational programme through an institutional link to a vocational school or university.

4. Coaches should be given the opportunity to share their experiences and develop their skills through formal and informal programmes. To this end, suitable institutional structures must be created.

6.0 Conclusion

Following two cycles of development and testing, the design-based research concept was employed on the one hand to specify the objectives of the EPC and on the other hand to identify and further develop key components for the practical application and implementation of the EPC within the SiA. Furthermore, the outlined design principles provide a basis for the further development and transfer of the EPC to other educational programmes of a SiA. Consequently, these principles can be used for concept development in new educational programmes of a SiA.

A further interesting question pertains to the extent to which the design principles can be transferred to domains of coaching application, such as vocational orientation, beyond the transfer to other SiA training programmes.

Design principles are characterised in the context of "design-based research" by the fact that they go beyond the scope of a singular (coaching) situation and aim to formulate area-specific theories that fit a broader context (cf. Cobb et al., 2003, p. 10f). It can thus be concluded that the design principles have an inherent claim to transferability; however, it must be noted that they were developed in a specific situational context (in this case: educational pathway coaching) and their significance is limited to the scope of this context ("contextually sensitive design principles and theories") (cf. van den Akker, 1999; Reeves, 2006). The extent to which the transfer range goes beyond the situational context of the development and evaluation processes would have to be examined in each case. It is evident that there is transfer potential with regard to the conceptualisation of an EPC in the SiA in other situational contexts. For instance, the design principles were introduced by the scientific support in the (further) development of the EPC at the SiA locations in NRW. In view of the 29 design principles that have been generated, some of them could be assumed to have far-reaching transfer potential, particularly those in the components "reflection impulses", "coaching discussions" and "relationship design". The extent to which the presumed potential can be realised would have to be explored through corresponding research activities in new situational contexts.

The limits of the situational context on which the study is based (educational pathway coaching as part of a SiA in five programmes) limit the informative value of the design principles generated. Compared to the claim of generating general, technological statements to guide goal-orientated action, design principles may be considered modest.

This prompts the fundamental question of what kind of statements can be expected at all in such a highly complex field as coaching or learning and teaching. Design-based research operates under the assumption that it is not possible for research to provide certainty for practical action; rather, it can 'only' offer a more or less empirically and/or theoretically well-founded orientation. To illustrate this with an example: "Reflection impulses should be designed in such a way that they are not perceived and accepted by the learners as a work or learning assignment" is one of the design principles. The manner in which this principle is implemented in a given EPC is the consequence of an adaptation by the coach. This indicates that research outcomes do not directly manifest as 'finalised' statements, but, rather, they are indirectly effective 'through the minds' of the practitioners. Consequently, the findings that are ultimately decisive for practical action are therefore not determined by the 'scientific experts', but rather by the practitioner's decision on the usefulness of the available scientific and other theories. Practitioners, or in this case the coaches, can utilise research results in the form of design principles, provided that they demonstrate tendencies and provide information regarding the successful application of a principle within specific conditions; at the same time, they are required to interpret the principle within the particular context of their design and to translate it into concrete action.

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Journal Details

EDeR – Educational Design Research
An International Journal for Design-Based Research in Education
ISSN: 2511-0667
uhh.de/EDeR
#EDeRJournal (our hashtag on social media services)

Published by

Hamburg Center for University Teaching and Learning (HUL)
University of Hamburg
Schlüterstraße 51
20146 Hamburg

Germany
+49 40 42838-9640
+49 40 42838-9650 (fax)
EDeR.HUL@uni-hamburg.de
hul.uni-hamburg.de

In collaboration with

Hamburg University Press
Verlag der Staats- und Universitätsbibliothek Hamburg – Landesbetrieb
Von-Melle-Park 3
20146 Hamburg
Germany
+49 40 42838 7146
info.hup@sub.uni-hamburg.de
hup.sub.uni-hamburg.de