CHALMERS
UNIVERSITY OF TECHNOLOGY

Competence Development by Formative Assessment

A comparison between an empirical context of competence development training and a theoretical learning process made for classrooms

Master's thesis in Learning and Leadership

Petter Isaksson

Department of Communication and Learning in Science
Chalmers University of Technology
Gothenburg, Sweden 2019

CHALMERS
UNIVERSITY OF TECHNOLOGY

MASTER'S THESIS 2019

Competence Development by Formative Assessment

A comparison between an empirical context of competence development training and a theoretical learning process made for classrooms

Petter Isaksson

Department of Communication and Learning in Science
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2019

Competence Development by Formative Assessment
A comparison between an empirical context of competence development training and a theoretical learning process made for classrooms
PETTER ISAKSSON

Supervisors: Johan Fleischer, Unico Consulting AB
Petter Falkman, Electrical Engineering, Chalmers University of Technology

Examiner: Samuel Bengmark, Department of Communication and Learning in Science

Master's Thesis 2019
Department of Communication and Learning in Science
Chalmers University of Technology
SE-412 96 Gothenburg
Telephone +46 31 772 1000

Typeset in LaTeX
Gothenburg, Sweden 2019

Competence Development by Formative Assessment
A comparison between an empirical context of competence development training and a theoretical learning process made for classrooms
Petter Isaksson
Department of Communication and Learning in Science
Chalmers University of Technology

Abstract

To perform successful competence development training, a desired concept is to have high quality training in shortest time possible. Due to lack of research combining working life education with learning methods and processes from school systems, this Master Thesis project has been performed to contribute to that field together with UNICO Consulting AB (UNICO).

One learning approach found in schools is Formative Assessment, where a few key strategies aims to create a learning environment where students feel comfortable and wants to learn, and teachers is gives the opportunity to develop their teaching. One main aspect of formative assessment is that tests are involved, which makes it a favorable process to take on when comparing the theory to the co-operating company's way of working.

UNICO are using competence validation (e.g. various tests) to confirm that trainees taking their courses meets set requirements during their educational events. The objective with this project is to investigate how UNICO may improve, by comparing their current work and guidelines with Formative Assessment, resulting in suggestions for further improvements.

The study has been performed by interviewing an educator at UNICO to understand their work, which they realize at several clients. Trainees at one client, which has been taking part of their concept, has been interviews to see how the process is perceived. Literature on competence development and formative assessment has been searched for and investigated.

From the analysis, positive and constructive aspects of UNICO's current way of working has seen to be in line with some recommendations, also showing lack of some.

Keywords: Competence development, Formative assessment, Learning objectives, Feedback, Social learning, Peer response, Peer assessment, Training, Validation, Chalmers University of Technology

Acknowledgements

First of all, I would like to thank the head of the master program Learning and Leadership, Samuel Bengmark, for his drive and support during the whole education. It has been a pure pleasure to take part of the combined education that is Learning and Leadership.

To finish my study, I want to thank my supervisor Petter Falkman, who has given valuable input on how to write this report and how to work. Also, I want to thank my opponent, Alice Allinger, who has been reading the report several times to give constructive input.

Now that my Master Thesis work is done, I really hope that it will be appreciated and possibly used to some extent, at UNICO Consulting AB were I have been working with it. I would like to direct a special thank you to my supervisor Johan Fleischer who, along with his other colleagues, have been very friendly from day one when I walked into your office without a clue of what was up ahead. I am grateful for all string that you have pulled and for all answers given during my work. I wish all of you the best of luck in the future, and is confident that you have a great future to come with your business!

To challenge myself, working alone with my Master Thesis, has been very valuable. Thinking that it was the final examination of my whole education at Chalmers University of Technology, I choose to do the work myself. Related to this, I want to send out a special Thank You to Emil Sjöholm and Stina-Maria Sandgren for your company during the majority of my time working with this study. Thank you for your constructive perspectives, coaching and support. Realistically, I would not have been able to do what I have done if you had not been there beside me.

Petter Isaksson, Gothenburg, November 2019

Contents

List of Figures

List of Tables

Abbreviations and Glossary

Abbreviations used in the report:

FA: Formative Assessment
UNICO: UNICO Consulting AB

Below, a glossary is presented explaining terms relevant for this report to be understood correctly.

Client(s) refers to UNICO's customers how buys and uses their services.
Competence refers to the combination of ability, knowledge and skills in total on a social and professional context.
Employee(s) refers to UNICO's client's employees.
Informant(s) refers to employees at UNICO, knowledgeable in their business.
Interview(s) refers to arranged meetings where a interviewer has prepared questions, and the involved parties are having a conversation about them.
Learner(s) refers to someone who is supposed to learn something, independent on age or context.
Respondent(s) refers to trainees (below) interviewed during this study.
Trainee(s) refers to employees who has been or is taking a course with UNICO in some educational forum.
Validator(s) refers to employees at UNICO who is responsible for a trainees competence validation.
Student(s) refers to pupils in school.
Test(s) refers to tests within competence development activities.
Validation refers to the process of getting confirmation on a trainees competence.

1
Introduction

Within this chapter, an introduction containing background, objective and purpose, delimitation's and research question for the study is presented.

1.1 Background

With regards to the outside world and competitors, it is important for companies to keep up with new research, technology and tools, thus making it important to educate employees (Hansson, 2016). Outsourcing of educational assignments and missions is usual now more than ever, according to Hansson (2016). It is stated that companies often sees it as favorable to hire personnel knowledgeable and willing to arrange their competence development, in fields the company itself is less knowledgeable in. This is done more often than developing their own way of working with employees professional growth (Hansson, 2016).

In motivation theories it is pointed out that individuals strives for personal growth when basic needs is satisfied, e.g., when you have a permanent employment and feel comfortable at work which makes you want to develop as a person and professional (e.g. Herzberg, 1982; Maylor, 2010). Obviously, it costs companies a lot of money having employees on training since they are not doing their daily assignments, which delays projects etc. Because of this, common sense tells us that shortest possible training with high quality is desirable.

Ellström and Kock (2008) presents a review of research on competence development, and states that their is a large empty space to fill, even though they gathered and been highlighting various important aspects that has been presented in research previously. Because of this, hopefully this study may contribute to research on competence development training in work life for adults, with the perspective of a school based teaching approach; Formative Assessment (FA).

UNICO Consulting AB

UNICO Consulting AB (UNICO) is a consultant company who plans and implements education and training for clients employees (trainees) to rise companies competence levels. Providing training in Computer-aided design systems, CAD, is one of their main expertise, both at companies and in schools.

One part of their various concepts is about competence validation where trainees are to take a test to show their skills and knowledge, after completing a course. The validation has been done at clients for a couple of years, but have never been evaluated nor does UNICO know how it is perceived. This is one thing they want to investigate further, but they have not got the resources to do it.

From presumptive clients, UNICO has started to get questions about their educational and didactic approaches[1], at which they are now focusing their own development. To become more lucrative in their genre, and to develop their way of working, they wish to become more credible by supporting their current training concepts by implementing methods consolidated in research and science. Here, they have wished for a project to be performed.

More frequently asked question from presumptive clients about methods used, and due to the validation part constituting a major feature of their business, some sort of education concept including tests would be preferred to be investigated and analyzed in comparison with their way of working. Here, FA comes to mind.

Formative Assessment

FA is a continuous and iterative process to help students understand what is supposed to be learned as an hour-to-hour, day-to-day and week-to-week arrangement. The purpose is to create a learning culture in which students want to learn and takes responsibility to learn (Wiliam, 2011).

The Swedish National Agency for Education, Skolverket, has been encouraging implementation of this approach in teachers daily work, and has shown to be successful in use even though it has brought some big and complex changes on teachers way of working (Vingsle, 2014; Klapp-Lekholm et al., 2010). A positive aspect of working according to FA is that teachers, while helping students, also gets responses on their teaching, which is valuable information to improve themselves as well.

Based on five different aspects of teaching, FA has shown to be a successful process were the teacher, together with its students is trying to answer three questions on an overall level: "*Where am I going?*", "*How am I going?*" and "*Where to next?*" (Black and Wiliam, 2009). According to Wiliam (2011), the five steps pointed out for teachers to work with is to (i) clarify expected achievements and learning objectives, (ii) create assignments which gives evidence of knowledge, (iii) give feedback to help students reflect and advance, (iv) make students learn each other and (v) make students owner of its own learning. Factors leading to high achievements and engagement, is the hand-out of challenging assignments and extensive feedback (Black and Wiliam, 1998), which is seen as important aspects in FA.

[1]M. Ehn, Personal communication, April 28, 2018.

1.2 Objective

This study aims to help UNICO to improve their way of working as educators at clients, making their service and offers more coveted than competitors. The concrete purpose of the project is to apply FA theory as a way of looking at UNICO's current work, to see how their concepts and methods are aligning with proven methods for increased learning. By this, a robust theoretical addition to build their current work on is favorable.

1.3 Limitations

The theoretical framework will be focused on literature and scientific theory about formative assessment, regardless of what ages the literature may be about. For the literature on FA, a delimitation is to give some suggestions on how to implement and use certain aspects, but there will not be a complete statement of performance.

Some literature on factors for successful competence development will be investigated to get a wider perspective and potentially fill a theoretical gap between education for youths and adults. This is meant as a complement for further analysis, which makes the contribution in theoretical framework a lesser part.

The term competence and its meaning will not be investigated. In this study, competence and competence development is seen as a persons current combination of ability, knowledge and skills in total, and some training program that will extend that field of competence.

Motivational factors will not be investigated due to the extension and manpower for the study, even though it is to be seen as related to competence development and would be interesting to investigate. In this study, an assumption is made to be that employees motivation to develop is high.

The study is delimited to perform data collection together with clients of UNICO's at which they have performed some kind of competence development training.

The making of any educational material will not be investigated, unless it is found very important to understand and describe to support the projects purpose.

1.4 Research question

To what extent does UNICO's competence development process including competence validation corresponds to guidelines for Formative Assessment?

2

Theoretical framework

This chapter covers relevant literature and theory in position of theoretical framework for the study. First, the meaning of Formative Assessment and how the iterative process works is explained. The sections treating Formative Assessment is slightly angled towards the investigated empirical context in some places. Secondly, general aspects for favorable competence development is presented.

2.1 Search and previous research

The literature review conducted has been performed mainly using Chalmers University of Technology's Library Search Engine. Some literature has been found by tips, and some by the snow-ball effect[2].

During the search for studies performed with the same type of perspective as this one, a lot of articles has shown to be about FA in interaction with students in various age, with various subjects and courses taken. There have been no findings on literature designated to the subject of FA combined with competence development training for adults, hopefully making this study a contribution to current research. Literature on competence development in general has been found to a large extent.

2.2 Formative assessment

During research for literature on FA, a wide researcher target group was found. Many pointing and referring to Dylan Wiliam who, together with Paul Black, came to collect a process combining various aspects of teaching in 1998. Thus, it is seen as appropriate to support the theoretical framework with FA according to Black and Wiliam.

Parts of the process for FA is not new, as researchers has studied its constituents for decades (Wiliam, 2011). Wiliam describes the FA process is a iterative process founded on five key strategies. He means that the various aspects are supposed to be worked on in order to create a well functioned classroom environment where students learning increases and creates a inner motivation to learn more, all iterative in an overall perspective. Hirsh and

[2]Finding new literature by investigating references in relevant literature.

Lindberg (2015) means that one important overall aspects for learning at its best is brought out when students are working together in interaction with their teacher, which FA enables to a large extent according to Wiliam (2011).

The five key strategies to be iterated, visualized in Figure 2.1, are

1. clarification of expected learning objectives, and make sure that students understands them
2. creating assignments which gives evidence of knowledge
3. giving feedback to help students reflect on what has been done and to advance
4. activate students as peer teachers for each other
5. make students owner of its own learning

The parties in this process is the teacher along with the student (also called learner) and its peers[3].

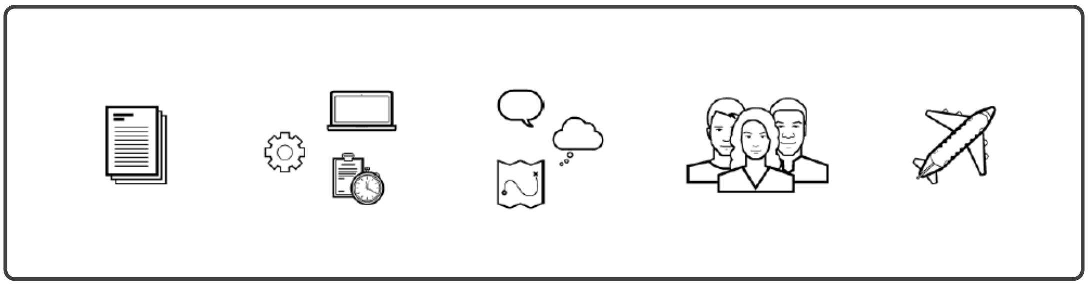

Figure 2.1: *The five key strategies for Formative Assessment (Wiliam, 2011). From left to right: Create and clarify learning objectives and make the students understand them, create activities where students may show current level of knowledge, give feedback to enhance learning based on the activity, make students work together, to make the individual student fly on its own. The process is supposed to be iterative i.e. again and again and again.*

Black and Wiliam (2009) contrasts various aspects of FA by presenting three main questions to be dealt with:

- ⋆ Where the learner is going?
- ⋆ Where the learner is right now?
- ⋆ How to get there?

The five key strategies may be linked to one or several questions to help understand and answer them along with parties involved. Table 2.1 illustrates what key strategy which answers each question.

As a student: To know where you are going, you need to know and understand the objectives, Perhaps a peer may explain it to you, if you do not understand it from the teacher or by yourself. Secondly, to know how big or what knowledge gap you are to minimize, you need to know where you are. One way to realize this is by taking part of activities that investigates the current state of knowledge, by yourself or together with others. Lastly, feedback from the teacher will help you see where you are going and what the goals are. Here, the responsibility

[3]The students classmates.

lies on the teacher to communicate with students on their level so they understand. Thus, being part of the social context and realize that you are in control of your own learning, is something that will help achieving set up learning objectives (Black and Wiliam, 2009; Wiliam, 2011).

Table 2.1: *Five key strategies (shortened) answers three vital questions for Formative Assessment (Black and Wiliam, 2009).*

	Where am I going?	**Where am I right now?**	**How to get there?**
Teacher	Clarify learning objectives	Create assignments	Feedback
Peer(s)	Understand learning objectives	Peers as teacher resources	
Learner	Understand learning objectives	Own its own learning	

Possible outcomes to be aware of when working with assessment, is that it may affect students self-image and motivation both in a positive and negative way, depending on how it is been handled by the teacher (Skolverket, 2018). Positive reactions wanted, are feelings which leads to students wanting to develop and analyze their learning situation, making them feel that they are able to evolve. Potential outcomes are visualized in Figure 2.2[4].

Figure 2.2: *A visualization of possible impacts on students when working with assessment, which may be both inspiring and engaging but may also bring out counterproductive emotions e.g. as condemning your own work (Skolverket, 2018).*

Seen from a teachers perspective, implementing FA in their daily work may take time due to its impact on the work:

> "The formative assessment practice is a very complex, demanding and difficult task for the teacher in several ways."

[4]Inspired by Skolverket (2018).

- Vingsle (2014)

Vingsle states that the complexity comes from needs to be well-educated in what motivates students, combined with knowledge in how to create, interpret and use information of students learning. Also, it is stated that the teacher has to be able to adapt its education to meet students needs. Lozic (2018) highlights the difficulties with assessment when it comes to separating students personal behavior and their performance. It is stated that teachers, even though they should not, may compensate students who does not perform as well as others by looking at their motivation and behaviour, making them biased in their review of performance. Feedback based on personal attributes will not help students to improve on their knowledge basis. Another aspect of difficulties for teachers implementing FA, presented by Jonsson et al. (2015), has shown to be that it causes increased administrative assignments for teachers. Constructively, they mean that there are not only benefits when working with FA, even if it has proven to be a successful way of working with learning.

A general warning about FA is presented by Hirsh and Lindberg (2015), saying that it may be interpreted as fulfilled if students are tested with short intervals. They point out that this is not the case, stressing that it is about creating better education for students when the teacher develops its teaching along with working on the key strategies. Hirsh and Lindberg mean that this common idea derives from efforts of making FA popularized and easily understood, which must be pointed out to be incorrect. Further, they argue that research on FA must be performed to a greater extent than what has been done today. They also advocates, that it may be better to reason about FA in terms of the key strategies separately to avoid misunderstandings about various aspects.

2.2.1 Clarify learning objectives

The starting point and ground pillar in the process of FA is to create understanding about learning objectives. Scientific research has shown that students who is given the possibility to hear about learning objectives is more prepared and has better opportunities to receive what is meant to be learned (Wiliam, 2011). In addition to understanding learning objectives, Skolverket (2018) also promotes that it is important for students to see how various performances on a task related to the learning objective may look like to get a better understanding of what is expected of them.

A challenge for the teacher is to create ways of explaining learning objectives on students current level of knowledge, which may be hard since the teacher is familiar with the studied subject and is the one planning the education (Wiliam, 2011). Wiliam is citing Mary Alice White who has tried to explain lack of understanding for learning objectives with an analogy between the classroom situation and being on-board on a ship, making it clear that it is an important aspect for learning:

> ”The analogy that might make the student's view more comprehensible to adults is to imagine oneself on a ship sailing across an unknown sea to an unknown destination. An adult would be desperate to know where he is going. But a child only knows he is going to school... The chart is neither available nor

understandable to him ... Very quickly, the daily life on board the ship becomes all important.... The daily chores, the demands, the inspections become the reality, not the voyage, nor the destinations."

- White (1971)

A research review on usage of scoring rubrics has been made by Panadero and Jonsson (2013), highlighting possible positive aspects of clarifying learning objectives with it. Scoring rubrics may be used to describe general or specific learning objective for a course respectively a lesson, showing various knowledge levels that may be reached (Wiliam, 2011). Panadero and Jonsson means that students may becomes less insecure in their situation, when this way of presenting learning objectives is used since it makes it clear on what is meant to be learned. A positive addition when working with scoring rubrics, is to let students compare set requirements for certain learning objectives and judge assignments to get a hold on what is meant by various levels of competence (Wiliam, 2011).

An example of a scoring rubric is presented in Table 2.2 , showing various levels for two various learning objectives achievements for a CAD assignment[5].

Table 2.2: *Example of a scoring rubric possible to use in a CAD course. Columns with letters E, C and A shows various levels of competence.*

Learning objective	**E**	**C**	**A**
Create models	The student uses the software's built-in tools to model **simple** details by editing in 3D, transfer 3D models to 2D drawings and then make edits according to standards with **satisfying** result	The student uses the software's built-in tools to model details by editing in 3D, transfer 3D models to 2D drawings and then make edits according to standards with **good** result	The student uses the software's built-in tools to model **complex** details by editing in 3D, transfer 3D models to 2D drawings and then make edits according to standards with **satisfying** result
Create sketches and drawings	The student creates sketches and drawings for production purposes with **satisfying** results according to current standards	*Same as for E*	The student creates sketches and drawings for production purposes with **good** results according to current standards

[5]To be relevant for UNICO's domain of competence development, an example involving CAD has been chosen.

2.2.2 Arrange activities showing students current knowledge

As a secondary step in the FA process when a student understands what it is expected to be learned, the teacher has to arrange activities where the current knowledge may be shown. Wiliam (2011) means that teachers usually takes this type of work to easily, often leaving out the element of how to receiving evidence for a students current knowledge, even though they plan an learning activity.

Also, he refers to a statement made by David Ausubel saying that

> "The most important single factor influencing learning is what the learner already knows."
>
> - Grundfest (1969)

In a support material for teachers put together by Skolverket, Pettersson et al. (2011) writes about judging students in vocational education programs, and how to convey assessment as something positive and important for both teachers and students sake. Five basic questions is presented about judgment and assessment independent on the subject of matter, which should to be answered due to current training and context:

- ⋆ Why are assessment to be done?
- ⋆ Who is to be evaluated?
- ⋆ Who will be evaluating?
- ⋆ How should the assessment be performed?
- ⋆ When is the assessment to take place?

Together, Pettersson et al. (2011) means that answers to these questions function as guidelines when setting up assessment, which is a important step in FA.

Pettersson et al. declares that knowledge and skills within practical education can not be assessed only by writing a theoretical test, because tests miss out on necessary connections to the professional work and is usually not aligned with the way students has experienced their education. It is stated that students who may perform a certain practical task, then are able to show their full potential.

> "It is vital to make the important aspects assessable, not making the easiest measurable aspects the most important ones."[6]
>
> - Pettersson et al. (2011)

2.2.3 Hand over feedback to improve learning

The third step in the FA process is to give students feedback on their performance. One definition given by Hattie and Timperley (2007) about feedback is

[6] "Det som måste vara vägledande är att göra det väsentligaste bedömbart och inte det enkelt mätbara till det väsentligaste."

> "Feedback is conceptualized as information provided by an agent (e.g. teacher, peer, book, parent, self, experience) regarding aspects of one's performance or understanding."
>
> - Hattie and Timperley (2007)

Wiliam (2011) means that teachers typically does not realize the consequences from mediocre feedback that is given just to get it over with, which may decrease learners motivation and performance.

Kahneman (2011) states that feedback should be clear and received fast, giving the learner the opportunity to correct its handling and-or thinking. Also, when a learner can not foresee a response, the feedback has its greatest effect (Hattie and Timperley, 2007). Feedback is preferably to answer at least one of three questions which gives three different perspectives of feedback; feed up, feed back and feed forward (Hattie and Timperley, 2007):

Where am I going?: The *Feed Up* is supposed to help the student to look up towards the goal, and understand it.

How am I going?: The *Feed Back* should be looking at what has been done to reach set goal, and assess the work.

Where to next?: The *Feed Forward* is supposed to tell where the learner is going next, by pointing it in the right direction towards set goal.

The various feed categories is illustrated in Figure 2.3.

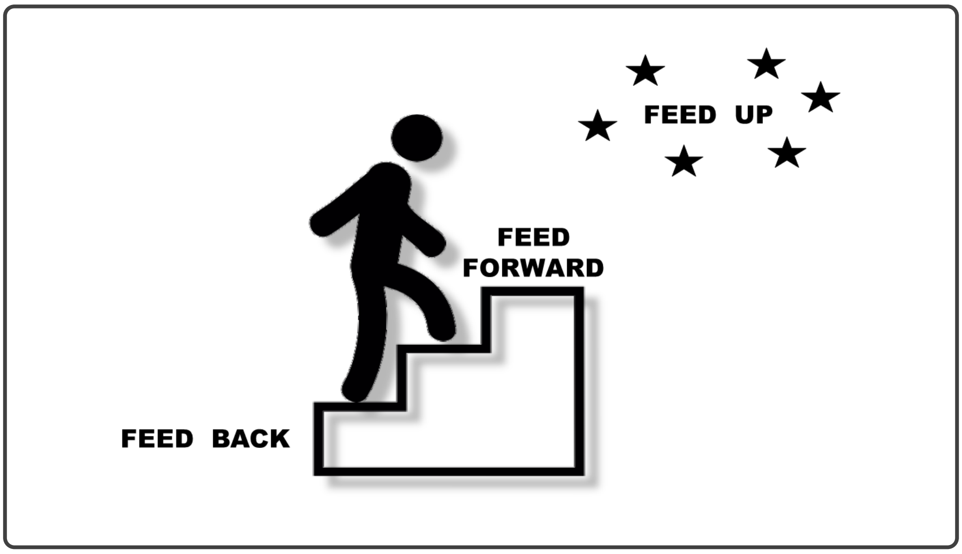

Figure 2.3: *Visualization of feed up, feed back and feed forward in relation to a student.*

Hattie and Timperley (2007) writes about four different types of feedback, all suitable for various situations depending on what the feedback is aimed for.

First of, feedback may be on a certain task that has been performed, which is the most common direction of feedback (Hattie and Timperley, 2007). A distinction between giving feedback and information is made, stating that lack of necessary knowledge should result in handing out further instructions rather than feedback on the task. It is claimed that, to be most powerful, feedback on a task should correct faulty perceptions and interpretations.

On a general level, feedback may be given on a process, e.g. to solve tasks similar to each other, is supposed to develop a students way of seeing the broader picture and dealing with error detection (Hattie and Timperley, 2007).

The third feedback approach is feedback about self-regulation, meant to improve the self-discipline and self-control of the feedback receiver, to help it monitor, direct and regulate its way towards learning objectives (Hattie and Timperley, 2007). Development of ones self-regulation is important, as dependency on external support and guidance makes a learner less effective (Butler and Winne, 1995). According to Hattie and Timperley (2007), Butler and Winne means that less effective learners

> "rarely seek or incorporate feedback in ways that will enhance their future learning or self-regulation strategies."
>
> - Hattie and Timperley (2007)

As an example, Hattie and Timperley deems that seeking help is one kind of self-regulation activity, showing that you take responsibility for your learning when you do not know something yourself. Also, being willing to make something out of feedback is an important factor for success.

The fourth type of feedback, which Hattie and Timperley (2007) discusses is doubtful even to be called feedback, is directed to the individual as a person. Hattie and Timperley (2007) mean that this diluted feedback on the self level is unlikely to be effective, since it makes ones attention focused on oneself and not on a task performed, also pointing out that "various meta-studies has demonstrated its ineffectiveness". Though, feedback that praises the engagement and effort put in to solve a task may still be motivating (Hattie and Timperley, 2007).

A comparison between the various types of feedback is being made by Hattie and Timperley (2007), stating that mastery of feedback on a self-regulation level is most desirable.

Related to time between a performed a task and to be given feedback, feedback on a task is at its best when given immediately. Feedback on a process level on the other hand, is preferably given some time afterwards (Hattie and Timperley, 2007).

A warning when working with feedback is pointed out by, e.g., Hattie and Timperley (2007) and Wiliam (2011), meaning that feedback is bad if taken personally and not being directed to the task, a performance or else.

Klapp-Lekholm et al. (2010) states that the most favorable feedback to increase students learning is by giving them comments, instead of giving them points or grades. Wiliam summons research showing that students focuses on the grade or points given, when given comments together with a certain grade. This draws attention away from the feedback to improve in the future, which is unfavorable (Wiliam, 2011).

2.2.4 Activate students to become teaching resources to each other

Wiliam (2011) gives several examples on studies showing that students who learns from other students has increased their learning significantly. Grounded in a socialistic perspective on learning, Wiliam indicates that it is the most effective way to increase learning. Skolverket (2018) stresses that assessment of peer students work makes students realize various levels of quality may look like, which develops their own ability to assess things relevant in school.

Dewey (1958) has pointed out the importance of learning in a community together with other humans in opposition to previous educators and philosophers, which had seen learning as an individual process, not taking the social aspects. Dewey means that interaction with others, by cooperating to solve problems, is the most meaningful and effective way to learn. He opposes the way students are forced or urged to work individually.

Phillips and Soltis (2014) highlights another view on social contextual learning, describing the Soviet psychologist Lev Vygotskij's *Zone of proximal development* (ZPD) which is a state of competence where a child may perform certain task with more or less help from adults[7]. A visualization of ZPD may be seen in Figure 2.4.

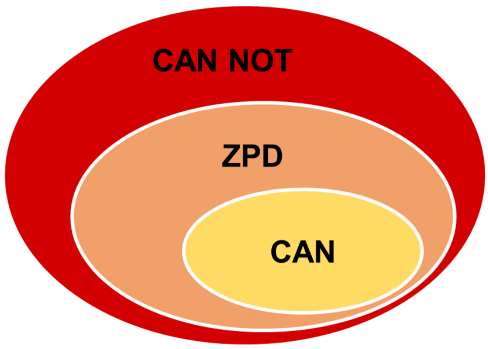

Figure 2.4: *Visualization of ZPD. A child possesses a competence it is able to use within a field of knowledge, which represents by the yellow ellipse marked "CAN". Outside that zone, there are things that it may cope with some help. This area is the ZPD. Outside of ZPD, required competence to solve a task is not possible to gain even with help, leaving the child in a state of "CAN NOT" do.*

Some examples on how to make students teaching resources to each other, is presented by Wiliam (2011):

Two stars & a wish: To get students started and comfortable with assessing or give feedback to each other, two stars and a wish is a simple way of doing so. It means that two positive things is supposed to be mentioned about a performance, together with one suggestion on improvement.

[7] Phillips and Soltis referring to L. Vygotskij. (1978). *Mind in Society.* Cambridge, MA: Harvard University Press.

C3B4ME: One way to make students help each other is to set up a rule, making students ask three peers of their opinion or knowledge in an area itself is insecure, before asking the teacher.

Peer review on assignments: By making students review other students work, their ability to reflect on its own work is being practiced on.

Questions from groups: After a presentation or in the end of a lecture, teachers usually asks if there are any questions. Unfortunately, often students do not take the chance to show their ignorance. Instead, if the teacher creates groups that may discuss uncertainties, then the discussion itself will help students to clear out their thoughts, even if they as a group do not come up with questions.

2.2.5 Activate students as owners of their own learning process

The fifth key strategy in FA has the purpose of making the learner more and more confident to handle its own learning. As stated by Wiliam (2011), as a teacher, you are unable to create learning. A big misunderstanding is that a teacher, if they try long enough, can make the learner learn (Wiliam, 2011). However, they are in a position to learn someone how to create learning, but they can not really learn anyone anything.

As told by Skolverket (2018), students ability to take responsibility and control over its own learning, may be strengthen by making the student learn how to judge its own work. The ability to do that may be taught by assessing the work of others (Skolverket, 2018).

Wiliam (2011) makes a metaphor, to describe how it usually goes when students are supposed to assess themselves in the beginning.

> ”It’s like making pancakes: you usually have to throw the first one.”

After some training, it will be beneficial (Wiliam, 2011).

2.3 Factors for successful competence development

To answer the question of what characterizes successful strategies for competence development, Ellström and Kock (2008) reviews research on competence development. They present a summary of important aspects affecting the overall competence development efforts, which are

(a) participants prior experience,
(b) the planning, content, design and implementation of the program[8],
(c) conditions related to the internal context of the organization and
(d) conditions related to external context of the organization.

Regarding participants prior experiences, e.g., Illeris (2006) and Rubenson (2006) means

[8] Program meant as a competence development arrangement.

that employees is more or less interested and willing to attend education depending on their educational background. Thus, Ellström and Kock (2008) argues that this needs to be considered when introducing and designing training. Illeris (2013) advocates that for all adults, it is important to have a say in questions about competence development meaning that they are not to be sent on education without a dialog.

Prerequisites for learning is that management and employees have a mutual approach in terms of trust, which e.g. includes feeling that you may fail, declare your thoughts and be able to get feedback (Blücher, 1999). From the management's side, Blücher means that it is vital to expect, invite and want everybody to be involved. If these aspects are not considered, the competence development will fail. He lays a great weight by creating enthusiasm and means that changes will only be temporary if not everybody is involved and have the drive to change. Ellström and Kock (2008) argues that at least a majority of employees should be included in training for it to have successful outcome.

Illeris (2013) brings up how competence development may affect employees in different ranges of age. He means that young adults, in ages 20-30, often have a stable identity and because of this they are willing to test their limits and develop on a professional and personal level. Older employees may have different priorities and could be more difficult to convince to take part of competence development, because of a realization that life is not eternal which makes them want to focus on whats most important for them. Illeris (2013) also states that this does not mean that adults have difficulties to learn, but that they are more selective with what they prioritize. Regarding education and age of trainees, Granberg (2004) is stating that children and adults learn in different ways. Mainly, it is because of children's inability to think abstract and and that they lack experience from life in general. Blücher (1999) means that adults tend to prefer being learned by fellow employees.

In an article, Soderstrom et al. (2016) writes about spacing, and the importance of retrieval, in learning situations to enhance learning. Spacing, i.e. the spacing effect, means that a repeated intake of certain information makes you remember it and learn it in an effective way (Bjork Learning and Forgetting Lab, 2018).

Saying that spacing is a solution is to jump ahead way to fast, according to English and Visser (2014). They mean, based on a experiment, that the effect of spacing and repetition is dependent on the individual, the subject of matter and if the learning is intentional or incidental. Through their study, they mean that spacing could enhance learning when being incidental, but may also be negative when being intentional.

3
Methodology

Below, a brief review of the research design to fulfill set purpose for the study is described, followed by a exposition of how the study was performed. The chapter is ends with a review of validity and a discussion about chosen methods. In the end, literature describing the procedure of performing a social scientific research project is accounted for.

3.1 Research design

Being able to answer set research question, the study was separated in four different phases. The phases were a literature study, an investigation of UNICO's current training concept involving validation, data collection on how the given training is perceived by trainees and a analysis phase where the first three phases could be tied together.

Given the starting point in FA being used in school systems, literature on the subject was searched for. Also, literature about successful factors and threats for competence development in working life were searched for as a additional complement, to prevent a big gap between theories on education for young people and adults.

Web-based applications used when searching for literature was Chalmers University of Technology's library search resources along with some public search engine's, starting with searching literature on FA followed by literature on the subject of successful competence development. Key words used were `formative assessment`, `assessment for learning`, `formativ bedömning`, `kompetensutveckling`, `competence development` and `successful competence development`. Some literature was caught up by tips, and some came to mind thought the snow-ball effect[9].

Based on social-scientific research methodology, there were many ways to collect data, such as surveys, interviews, observations, reviews of documentation, focus group interviews etc. To perform inductive research, collecting data including peoples opinions and feelings concluded in an qualitative method. Interviews were chosen as data collection method, described to be a favorable approach where the interviewer gets the chance to ask prepared questions according to chosen guidelines possibly complimented by spontaneous follow-up questions.

Suitable people to interview were those willing to explain how UNICO's current work is or has

[9] In this study, the snow-ball effect refers to a way of finding new literature by following up found literature's references.

been. Employees at clients who has taken part of some sort of course including validation was seen as a primary group to contact, who were to give valuable views based on experience from UNICO's way of working. Likewise, but not as prioritized, was to interview trainees at clients which had taken a course without a validation to get their perspective. Others appropriate to interview were employees at UNICO, involved in courses arranged to understand aspects of hows, whats, whens and whys in UNICO's business. In this context, the ones responsible for hiring UNICO and taking part of their services was seen as interesting stakeholders to interview, potentially to give more perspectives on the arrangements and trainees anonymous considerations.

Requests to perform interviews was sent to clients, asking for their own and trainees participation (i.e. their time) in exchange for making UNICO's services and process even better by their cooperation to gain they in the long run. A second approach was to offer UNICO's current service pro bono , e.g. for one single occasion [10] .

To perform effective and favorable interviews, an interview guide (i.e. a script) was prepared for each of the different categories of prospective interview objects. Interviews was to be held as physical meetings if possible, finally coming down to digital video applications and telephones used with interviewees, using a voice recorder which premiered listening and transcribing afterwards. The purpose for all interviews was to identify similarities and differences in opinions from each side of the business arrangement. To make respondents think of competence development not just from their trainee perspective, some twisted questions where included towards the end of the interviews. Data to analyze was collected from two respondents and one informant interviewed.

One focus group interview was performed after observing a full day course without any validation at one client, including four persons taken part of the course. Data from the focus group were not included in the analysis due to a majority of irrelevant material turning out to have a weak connection to set research question.

When data was collected, a summary was performed including narrowing down the essential input from interviewees. Subsequent, data was analyzed in combination with key factors presented in Theoretical Framework to answer set research question.

3.2 Data collection procedure

Below, a description on how the data collection has been performed may be read about.

3.2.1 Data collection method

The study has been conducted as a inductive research process, investigating an empirical context and then to let conclusions be drawn on a general level, backed up by collected data including read literature.

[10] *is this to specific and/or irrelevant?*

Being able to answer set research question, investigating UNICO's work from an pedagogical and didactic perspective, data is desired to come from people they work with. According to Esaiasson et al. (2017), a qualitative approach is favorable when investigating how people feel and perceive different aspects of an area, for example a certain situation or a special event. By qualitative methods, understanding the investigated subject or persons reality is the goal (Esaiasson et al., 2017). They mean that working with a qualitative approach, in an inductive way to make empirical observations, the investigation aims to illustrate as various aspects as possible. It is pointed out that qualitative data is not to be used to draw statistic conclusions.

Esaiasson et al. (2017) means that the most usual way to collect data is to perform interviews. One significant advantage with performing interviews, in relation to other potential qualitative methods, is that the interviewer has the opportunity to ask follow-up questions to investigate feelings and thoughts further (Kvale and Brinkmann, 2014). Interviews may be planned to be structured (questions to be following a specific order), semi-structured (questions arranged with various themes to enable flexibility depending on conversations topics discussed) or unstructured (having a few overall questions to be talked about spontaneously).

Semi-structured interviews were chosen, enabling having conversations and dig deeper into interesting opinions to collect data.

3.2.2 Interviewees

Esaiasson et al. (2017) presents two different selection groups of interviewees; informants and respondents, possible to interview depending on what type of perspective that is wanted. As for this study, interviewees with people from both categories where performed.

Esaiasson et al. (2017) defines the function of being a respondent as a source of feelings towards the investigated subject. One important aspect of interviewing respondents is to get as various input as possible (Kvale and Brinkmann, 2014). Age, sex, work preferences and time working at a company is exemplified to be advantageous variations, which gives maximal variation among interviewees according to Esaiasson et al. (2017), adding that it all depends on what is investigated. Kvale and Brinkmann (2014) points out that it has to be decided if respondents are to be chosen randomly or to be selected. Requests for respondents where sent to managers at clients, with the request to interview employees.

An informant is a type of person who, according to Esaiasson et al. (2017), is a so-called truth-teller that is seen as trustworthy to tell how reality is. The informant may speak for a company and present a wide [11] picture of the organization or be an expert on the subject investigated in a study. The perspective presented by an informant are to be reviewed with a critical approach, since it becomes as a source of knowledge (Esaiasson et al., 2017).

An informant representing UNICO was chosen with respect to time and willingness to be interviewed. The informant is working as a educating consultant, and has worked at UNICO for more than ten years. In this particular case, the informant was expected to explain the

[11] *may be implicated incorrectly*

company's line of work together with clients, more specifically to tell about the process from getting a mission at a client, market and arranging competence training to get employees on training. Thoughts on interviewing an informant UNICO was also was to collect data on how they work with courses and how they handle trainees, which is meant to be used to compare theory on successful competence development and FA with the daily procedures.

3.2.3 Interview guide

As research questions has been formulated and a qualitative way of performing the data collection has been set, according to Esaiasson et al. (2017), the next step is to create a interview guide. It is important to try to foresee how different questions may be perceived, and because of this a test interview is highly recommended. To make the test more valid, it should be performed with a person who is similar to the actual respondents (Esaiasson et al., 2017). After the test interview, questions may be added, withdrawn och edited making the guide more useful.

A test person similar to the intended respondents was hard to find, finally coming down to having a meeting with a peer student where questions written were asked. Then, the peer student gave input on how it perceived the question explaining what it thought respondents may understand it. Afterwards, some questions were reviewed.

As an addition and complement to reviewing a interview guide after some sort of test interview, Dilley (2000) states that the researcher must revise the guide in between ordinary interviews goes on, since new knowledge on the investigated case may be found and new questions may be found as appropriate to ask. Between interviews, follow-up questions suitable for asking future respondents were added with the purpose of having as similar questions as possible for all.

An overall way of thinking when creating the guide followed guidelines from Kvale and Brinkmann (2014), stating that questions should be in descriptive form, thus being based on a "how" or a "what", preventing questions answered with only a yes or no. Also, questions starting with "why" was avoided, as suggested by Esaiasson et al. (2017) meaning that the interview may take a undesirable turn towards a hearing, which should be prevented. Esaiasson et al. gives further guidelines for the guide, where the interviewer starts of with a short set of warm-up questions, before getting to the actual questions regarding the investigated subject. Dilley (2000) expresses it as to be done to make the interviewee feel at ease and establish a calm dialog from the beginning. In addition to creating a harmonic atmosphere, Kvale and Brinkmann (2014) gives the advice to set aside time for the interviewee to think without acting stressed to following a strict time schedule. It is all about making the interviewee feel comfortable enough to invite the interviewer into their world.

The interview guides for respondents is found in Appendix A, and the interview guide for the informant is found in Appendix B.

3.2.4 The interview procedure

During an interview, the interviewers work is to collect and understand the interviewee (Kvale and Brinkmann, 2014). One way of ensure that information is perceived the right way giving trustworthy data, is to summarize and retell what has been talked about (e.g. about a specific question). Thus, the respondent have the possibility to either add something or correct its previous statements.

The respondents were interviewed per a digital phone application. One had time to take its interview during daytime at its work place, and one at home during the evening.

Esaiasson et al. (2017) gives a suggestion that interviews should be about an hour to connect with the interviewee. Depending on the guide, it is stated that a shorter interview may give a lot of information. Kvale and Brinkmann (2014) means that it is important to have time to let the interviewee think during silence not feeling pressured to answer questions quickly.

The time estimated for the interviews were set to be about 40 minutes, with the intention of getting respondents on board with their participation for the study. Thus, recommended time by Esaiasson et al. (2017) was not followed, but at the same time recommended length for interviews are stated to be flexible.

The informant interview was arranged at UNICO's office in Gothenburg, where the informant was supposed to feel comfortable (Kvale and Brinkmann, 2014), a couple of days after the respondents had been interviewed.

Interviews were recorded with a dictaphone, and transcribed afterwards. Not to make any interviewee uncomfortable being recorded, all interviews started by asking if they approved it.

3.3 Analysis

When data was collected, the analysis began with a summary of data before trying to find general explanations and conclusions connected to the research question.

3.3.1 Summary of data

To be able to handle collected data, the first step in the analysis is to compress it which makes it manageable (Esaiasson et al., 2017). As they describes it, the summary should lead to highlighting the important, individual characteristics and wipe out irrelevant data that might have followed in e.g. a transcript. One method for compressing data mentioned by Esaiasson et al., is to create short notes about answers on vital questions from each interview to get an overview.

Regarding data from informants, Esaiasson et al. (2017) argue that there is not to many options on how to analyze. It is advocated that it is about trying to get a overall picture of what the organization want to do or to cover what has happened during a certain event.

When it comes to respondents answers, they call that it gets more complicated. One way to sum up the data is to organize each story in chronological order to get hold of the central parts. In this process, the writers means that it is the researchers job to work through all data and structure it in a time line.

Motive for summing up data according to a chronological story was to be able to identify the characteristic, vital parts of FA; how did something come up, how was it handled, what did the respondent feel about it etc. After creating a story - or a process time line - out of the informants point of view, comparing gets straight forward when similarities and differences appears side by side.

3.3.2 Generalization

To be able to generalize results in an analysis, summarized data needs to be handled to discover patterns. Esaiasson et al. (2017) mentions a method called the mapping method [12] which means that relevant aspects of a phenomenon is mapped in different categories. The delimitation's of aspects should be motivated and preferably distinguished so that one statement can not be put in more than one category. Categories should not be determined in advance (Kvale and Brinkmann, 2014).

Although, since the FA guidelines is vital for the study, five categories were set up before beginning to place statements; learning objectives, activities, the feedback, peer teaching resources and ownership for future learning. Other categories where created parallel to the process of reading and interpreting statements.

3.4 Validity

Below, the validity of the performed literature search and data collection will be written about.

During literature search on competence development, a great deal of books and articles was found. Since the primary target of the literature about FA, a limitation on what to read was made to make the most out of the time. To make the reading go smoothly, mainly literature in Swedish and translated to Swedish were investigated. A positive aspects of this is that the theoretical framework may support the empirical context of UNICO's work, but a potential downside is that Swedish and Nordic research on competence development may not be as evolved as in the rest of the world.

From the beginning, an active choice was made to perform interviews with respondents before interviewing any informant. This choice derived from Kvale and Brinkmann (2014), and was thought of as a way to keep the interviewer unbiased and curious for respondents answers. Making the interviewer willing to learn more of respondents situation, not being affected by an informants descriptions about UNICO's point of views with their concepts, was aimed for. This way, interviews without any expectations of what could be answered on

[12]"kartläggningsmetoden" in Swedish (Esaiasson et al., 2017).

questions was performed.

By asking for interviewees approval of being recorded, it is possible that their knowledge of this made them withhold or prettify statements. It is hard to say if this has affected the data in a negative way, but it is shown that interviewees have had constructive opinions throughout the interviews, which may be a sign of them not being affected by it. Either way, not being able to record interviews, making it vital to take notes during interviews, could have made data biased due to the interviewers perception of statements, not given time to reflect on answers and ask thoughtful follow-up questions. This might had influenced the data collection even more, in an negative way.

Trainees opinions and feelings towards UNICO's current way of working has been searched for. Concerning reliability of the chosen method to fulfill the purpose and making it possible to answer the study's research question, it is believed that motives for a qualitative interview data collection given by Esaiasson et al. (2017) and Kvale and Brinkmann (2014) is valid.

To be taking a interview during work hours, at work, may have been stressful for respondents, knowing that they are at work without doing what you are there to do, for a time. Though, the one respondent in this situation respondent constantly repeated that it did not have any time to adapt itself to, making this data as valid.

Because of GDPR[13], connecting with respondents had to be made through their managers who directly did ask if they wanted to join the study. In this step on the way, it could not be controlled what was said or done. A recommended message to forward to employees was sent to managers, but if this was used could not be controlled either. One way to handle this concern was to ask respondents who did join the data collection what message or request they had got from their manager in the beginning of their interview, to get hold on their attitude and perception. Answers were not included in the data collection since it did not create any concerns, i.e. they expressed a happy feeling towards taking part of the study and contribute to it. The experienced feeling of the interviewer is that the respondents where engaged and enthusiastic, not have been forced to participate. The unknown aspects are what impression potential respondents who did not join in thought of the study.

During all interviews, a balance between asking questions to move forward and pausing to make interviewees think in silence was striven for. Non of the interviewees seemed stressed due to time passing by, which is perceived to have given them the time they needed to answer most questions. Perceptions from listening on the recorded interviews afterwards verifies that their were pauses every now and then.

One aspect making the given data from respondents reliable, is that they individually has been consistent with their opinions throughout the whole interviews repeating themselves, which is a positive aspect (Kvale and Brinkmann, 2014).

Interviews was recorded with a dictaphone, making the retyping accurate. In this study, all interviews has been fully transcribed word by word without any outside additions, which according to Kvale and Brinkmann (2014) is important for a reliable continuation of the analysis.

[13] General Data Protection Regulation

Since the study has been performed by one person only, there have been no fellow student briefed enough to perform a checkup on the categorization of transcript pieces, which according to Esaiasson et al. (2017) is one way to increase the reliability of the result. Later on in the process, another way to increase reliability is by having several people interpreting questions and answers to see if they perceive it the same way (Kvale and Brinkmann, 2014). Still, there have been no fellow student briefed enough to help out with this.

3.5 Method discussion

The Methodology discussion will describe and evaluate the methods used, both in a positive and constructive way.

The interview guide is recommended to be tested with a person who is as alike the expected respondents as possible. In this case, a short test was made with a peer Master's Thesis student to investigate how it perceived the questions without giving answers, but to explain what it thought that others could interpret from each question. Thus, the interview guide was not tested according to guidelines which may be relevant for the result, since result from the data collection builds up the conclusions and answers to the research question. Instead, the guide was tested on the first respondent. To forestall the respondents potential thoughts about unprofessional acting, this was declared in the beginning, which did not bother it. Opposite, it said that it made it feel more comfortable which may be seen to have contributed to a pleasant atmosphere.

To get enough of respondents, the time for interviews had to be compressed to enable them to take time from their daily work. Thus, interviews did only deal with the most important aspect on their own experience of UNICO's training. The most vulnerable aspect with this is that the interviewees may not have felt as comfortable and relaxed as they could have, possibly making them insecure and unopened about their thoughts and feelings. Because of minimalist time for introducing talk and warm-up questioning, even though the respondents moods have seemed positive about participating, it should be stated that the decision has a constructive impact in the data collection. In the heat of the moment, they did not seem concerned about ending the interview. Contrariwise, after all questions, they asked questions about my education, my thoughts on the future, also sharing their own personal thoughts on doing a master thesis work and start working.

One thought on how to get respondents to come up with new ways of thinking on competence development, was to include some questions where they could reason about competence development as if they were in charge of planing some kind of educational activity. This way, where time did allow it, it was possible to hear them talk and reason about their own important takes once again. Afterwards, it is seen to have given some further developing thoughts as data to rely on.

A constructive way of looking at the data collection is that two respondents may not have been given maximal variation in answers on questions. The two respondents gave the same type of answers and were very alike in their mindset, on an overall level.

One of the respondents did the course and validation two years ago, which may be seen as a weakness in reliability. Memories from a long time ago seems to be one out of two things, according to Kahneman (2011). Either, the memories is biased to be more positive, or more negative than the whole experience actually was. The respondents although, did answer questions without hesitation or complaining on its own memory.

Due to circumstances on the focus group interview which was possible to perform spontaneously, insufficient preparations such as creating a specific interview guide made the result to weak to analyze and relate to other data. Not to overreach, but relying on data from the focus group would have made the result more ambiguous and unreliable. The focus groups had no experience of the investigated training concept.

About performing respondent interviews before informants, the thought was intended to make interviews unbiased seen from the interviewers perspective. Though, it may have affected the informant interview instead. Thus, creating a paradoxical situation which makes the choice creating a favor for one party either way.

4

Results

Below, the summarized results are presented in categories referring to the key strategies of Formative Assessment. Data from the informant and the respondents are presented and analyzed all together compared and reasoned about supported with theoretical framework.

4.1 Conditions

The course taken by trainees is about the 3D product design software Catia V5 (Catia) based on a online self-study material that ends with a validation test of employees acquired competence. After the test has been taken, feedback on the trainees performance is given together with an approval or rejection on meeting set requirements. Figure 4.1 shows a chronological time line of these steps. This concept has been brought out to several clients, and the format is meant to serve clients with a course that may be used in a flexible way depending on other work assignments trainees may have.

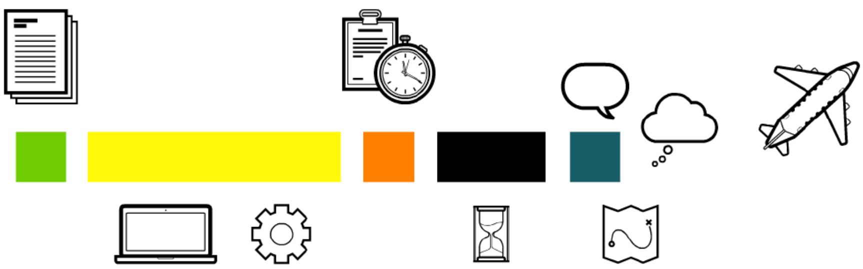

Figure 4.1: *The empirical context studied, as described by the informant and the respondents, starting with information of the course, given some time to work with the material, taking the test and the waiting to receive feedback, before getting a go or no-go on the course in total.*

The self-study material is structured in sections where there are theory in text with complementing pictures showing various views of the software in use. Each section is ending with one or several exercises for the trainee to accomplish. The material starts with a section that is directed to beginners who is unfamiliar with the software, for them to catch up on the most basic expressions and how the software should be used when, e.g., opening and saving files.

The respondents interviewed (one male and one female) has taken the course in Catia two years ago (R1) and four months ago (R2)[14].

R1 got hired during the spring of 2016 without a consult assignment and was looking to take a course, to make it more attractive to be leased out. Its manager came up with the suggestion to take a course in Catia, since it is a commonly used tools at several client collaborators. It was R1's initiative to take the course, which was worked with for two weeks straight. After one week of working with the course, an consultant assignment at a company was agreed on, which took of after finishing the course.

R2 got hired in the beginning of 2018 without a consult assignment, and began to work with internal projects. Before getting the employment at the clients, it had been looking for jobs and realized that Catia was a program advantageously to have on ones resume. At the client, a inner drive to learn Catia was presented by the manager which lead to taking the course. Effectively, working with the material was performed for two weeks during a three week period. Some time after the course had ended, R2 got its first consultant assignment.

4.2 Clarification of learning objectives

As seen from UNICO's point pf view, the process and the expected progress during training is told in the beginning of the course. The results aimed for is that the trainees are supposed to acquire a certain competence level, which is set by the client since it knows what their customers require out of their employees. Thus, UNICO gives out material to meet this gap of competence.

When signing up for the course, it came to the respondents knowledge that a validation test was included, and would be taken afterwards to confirm or gainsay that the expected competence level were met. When asked about the arrangement for the course, opinions on the validation test were that none really knew what the test would be like or what working with the material were supposed to teach them. One respondent sees this a something good:

> "It feels like you're motivated to learn every little detail so you don't fail the test."

4.3 Assignments to show current competence level

The activity aiming to show a trainees competence, is a test taken after a self-study material has been worked with.

No matter if the validator is at the clients office - which has happened but not that often - or not, the validation is performed on-line on the trainee's computer. The validation itself

[14] without mutual arrangement considering the parentheses in the sentence.

is a practical test where the trainee is given one assignment at a time which is sent to the validator when finished or when the given time for the specific assignment is out. Then the trainee gets a short break before it is given a second and third assignment with the same arrangement. The purpose with this set-up is said to be that the trainee is helped to concentrate on a certain type of work in Catia, not making distractions between different ways of working. Also, it is said to be kind on the trainee which is not supposed to feel it as a examination where you have to sit constantly for the whole time.

The trainees are to solve the assignments to the best of their ability.

It is expressed that the assignments, especially the last which has been told to be the most comprehensive, were challenging for both beginners and more experienced trainees.

> "That assignment [the last] is probably for both beginners and experts, and will still be a challenge for everybody due to that it is so much you can do to complete it. [...] 'and I can totally see how come they have created this assignment the way they have; it is challenging and may indicate where you are on a scale from novice to adept.'."

When asked about if the test should have been both theoretical and a practical part, in unison respondents beliefs that a practical test is for the best.

4.4 Feedback

When the test is finished, it may take up to a week before the validator has reviewed the assignments. For respondents in this study, it took a week to get the feedback session. Overall opinions on repeating what had been done in the test has been told to be appreciated.

> "[. . .] where [the validator] showed me, like 'This you could have done better, and think about this.' and so on. Well, I think it was very good actually."

> "[The validator] told me what was good and why, and what could have been better. Then he told me what to practice on, and then I got approved on the course. My thoughts are that it was a good way of having the feedback."

One respondent also points out that the conversation with the validator on some assignments made it realize how it should have done, with made it more clear how to use the software in the future. Here, the spacing advocated by Soderstrom et al. (2016) and Bjork Learning and Forgetting Lab (2018) has positive effects.

The collected data points out that UNICO's purpose and work with feedback is appreciated; making trainees aware of why something has been performed according to set requirements or not. Also, the time in between doing and receiving feedback on assignments did make them remember what they had done even better. As pointed out by R2, it gave a lot for future use with the software.

From the company's point-of-view, the validator contacts trainees with one out of three possible outcomes of the test:

- ⋆ The trainee did not live up to set requirements on one or several of the assignments, which leads to a walk-through via a video application presenting what has been missed or unfinished. Then it is possible for the trainee to either redo the course or redo some of the sections in the self-study material before taking a new validation test.
- ⋆ The trainee did met the set up requirements on an approved level, is contacted via a video application and will be given feedback on what is well executed and what could have been even better. These tips are given so the trainee will have something to think about and work on in the future.
- ⋆ The trainee did met the set up requirements very well. It may vary, but sometimes the trainee is given notes in a mail on how it has performed, with the opportunity to have feedback via a video application, or it will be contacted directly to be given verbal feedback.

The way of giving feedback is well thought-out according to literature, as UNICO not only gives feedback saying that something has been created in a good och bad way, as they also fills out with aspects of *why* something is seen to met set requirements. This makes the feedback focused on the professional performance, which Wiliam (2011) and Hattie and Timperley (2007) states is important to prevent negative feelings for the person towards itself.

4.5 Peer teaching

For the training investigated, the lack of cooperating and working with other trainees is significant.

To make some statements about the two various sides of theoretical framework used in this study, a first pointer is that the collective learning is presented as a key factor when it comes to competence development among adults, which also is highlighted as the fourth key strategy in FA.

Constructively, a favorable change and improvement would be to make trainees interact with others, regardless if trainees are employed at the same or different clients. This might imply UNICO to work with connecting trainees at different clients who is sitting with the same course, but with the support of presented theory it would be a successful addition to their appreciated training concept.

4.6 Own the learning process

During interviews, it has been shown that the respondents who is highly educated is driven to learn more in their working life. From the beginning, their approach to take the course has come from themselves, which makes the fifth key strategy of making trainees own their own learning negligible in this case.

What is to be considered, are trainees that is forced to take courses even though it seems like a doubtful approach from the client. Then UNICO would have to take a role of creating a inner motivation to learn more.

4.7 Overall

Opinions are alike when talking about taking a course without any validation, which is seen as if something would be missing. One respondent describes the positive aspects of validation like

> ”It leads to a confirmation on what you are good at or not, and what needs to be trained on further. It is really good to know for yourself.”

5
Discussion

In this chapter, the results and analysis is resonated about. Additions to validity and reliability for the whole project will be made.

One large, overall thought on this study is that UNICO's way of working, at least in the investigated context, has turned out to work according to several theories of pedagogic and didactic learned about during my own education in Learning and leadership. Seeing to FA, the thoughts are very much in line with the concept, even though all is not totally in place.

Regarding this study's objective, it is of great importance to be aware of the meaning with FA, especially if it is a learning process UNICO want to bring into their current way of working. As highlighted by Hirsh and Lindberg (2015), the expression FA may easily be misused and generalized. Based on their positive ambitions to develop as a company, one thought is that UNICO's petition could put them in a situation of contributing to a misunderstanding in an industry or work sector where it may not have been heard of. This is hypothetical, sprung from the idea that they might take inspiration by FA in their work. A warning not to make use of the expression in an excessive selling way in a potentially unfamiliar environment is seen as a appropriate advice for UNICO to take into consideration.

As stated by Jonsson et al. (2015), work with FA comes to a price of heavier administrative assignments which, if performed as alike as in schools, may be critical for a company which may need to put away a share of money to do this kind of work. At the same time, working according to FA guidelines with one or two trainees at the time, it would not be as demanding as handling a class of e.g. 20 students.

Given the time frame of this study, from April until August, with a long lasting planning period - which is a important part of the study obviously, but - finally coming down to several missed opportunities for interviews in times of 'salary meetings' and vacation coming up. In a way, it was a tight time frame to make a well-thought plan and starting to sent out interview requests in April, since the research question was not set. After studying and learning to take time to plan a project, the choice of making a well planned study came first, which could be seen as a factor for having a lean set of respondents.

When it comes to interviews and the respondents answers on certain questions, it is impossible for me not to think about Kahneman's book *Thinking, fast and slow* (2011) and all the biases that is circulating in the book. Summarized from the book as interpreted by me, when asking a question about something, persons who might be familiar with the subject is biased on different ways and has to relate to what it has been through. For example, a person who has taken part of competence development without some sort of validation, will probably be negative to validation. On the other hand, a person that has taken part of validation and appreciated it, will give the unsurprising answer that they still prefer to have the validation.

After compiling answers from respondent at interviews, it is clear that their thoughts on having validation as a part of the process has been successful. A probable explanation for this could be that the number of respondents has been to few, which is a critical aspect of the reliability.

As presented, one of the respondents means that there was a good thing that it did not know exactly what was coming on the test. This type of reaction may be seen as preferable, but it can not be expected by everyone. By this, it is important to prevent the opposite reaction; to get trainees stuck with feelings that there are to much to learn that may be on the test.

At a first view of the FA process, it may seen strange to have 'making the student the owner of its own learning' as an employee usually and hopefully already is motivated to develop their skills and knowledge base, but it is also about creating a feeling of curiosity and a inner drive to evolve.

The fact that Wiliam (2011) points out that teachers usually saves on planning even though they are to plan some parts of a lesson or a course, makes a valid point to discuss. My interpreted spirit of it all, is that planning which has been done half-good could have been undone from the beginning. On the other hand, of course some planning is better than non. Planning a lesson, as Wiliam means that teachers usually does, not putting enough effort in the planing even though they take time for it, is too bad. Here, others working with education is seen to belong to the same group of people as teachers, making me want to encourage educators selling their services to go the extra mile during planning phases. One thought is that planning made well, may be used again and again which saves time in the long term.

Recommended questions from Pettersson et al. (2011) to be answered for greater understanding of evaluation and judgment of tasks to create a healthy assessment environment, is something that I believe may be valuable for all kind of students no matter age or educational forum. With Blücher (1999) and White (1971) in mind, adults is potentially even more eager to know answers to questions like why, what, when and where - related to assessment - than younger students. To underpin all forms of tests by declaring the circumstances, is something that I argue should be seen to be trivial thoughts among all trainers, with the addition to verify that the one being judged has a chance to ask questions to be involved and to show its engagement.

With respondents background taken into consideration, it is important for those unfamiliar with the concept of validation to have it explained. According to Pettersson et al. (2011), the following questions might help to explain the purpose:

- ⋆ Why are assessment to be done?
- ⋆ Who is to be evaluated?
- ⋆ Who will be evaluating?
- ⋆ How should the assessment be done?

- ⋆ When is the assessment to take place?

Regarding time spacing between taking the test and the feedback, it is positive that UNICO is doing their thing more or less substantiated by common sens in some way. To make their trainees revalue what they have done during the test could be said to be what spacing is about, and therefore it is pleasing to say that they are working according to aspects supported by e.g. Soderstrom et al. (2016). Although it has been positive in this study, it should be noted that other respondents might not have had the same opinion, considering English and Visser (2014) who advocated that circumstances in the learning context is crucial.

On the topic of the peer teaching section in Results, constructive aspects has been pointed out due to non-existing collaborations for trainees. However, it is not strange that companies does not hire personnel with the same type of competence gaps to be filled in the beginning of their employments. With all facts in hand, that might had been even stranger. Seen rationally, it would make two employees from the same company compete for the same competence and same job, possibly. Still, it would have made UNICO's possibilities to arrange collaboration assignments look better.

From my point of view, it would be possible for UNICO to arrange peer education between clients, but it comes to the price of planning, administration and possibility some logistics. If clients would not be against it for some reason, then it could turn out very well to get some sort of collaborative activities.

5.1 Recommendations

UNICO's choice of having practical tests is supported by Pettersson et al. (2011), even though it could appear to be trivial. One recommendation for UNICO to work with, is to have their empirical context of training to be even more like the iterative process thinking in FA. Then they could have separate validation assignments to be held at different times, to know that trainees has satisfied themselves with the right knowledge to continue with the material. Potential, profitable aspects gained by this could be that trainees empowers themselves and knows that they are in the right track towards the education goals. Potentially to be seen as both good and bad, UNICO then would have a continuity in assessment and feedback along a trainees progress. Though, it is a question of labor and time that has to fit.

Self-assessment of your own work is called to be a good way to know what you abilities are and what you could do better. It is said to be difficult in the beginning, but may create positive effects after a while (Wiliam, 2011). For the type of training concept investigated, the time it would take for it to be beneficial may not be advantageous. Possibly, UNICO could have some sort of light variant of the concept, having trainees evaluate their own completed test before the feedback session.

5.2 Future research

On aspect only mentioned in the study, is the question about motivation, which has a large impact on ones ability to perform well during training and competence development activities. FA is said to help motivate students, but what about when managers at e.g. UNICO's clients tries to engage and motivate their employees to take a course, possibility leaving it up to UNICO to motivate them. How could or should UNICO act on this? How may UNICO help their clients to motivate presumptive trainees?

Something else that would be interesting to investigate and work with is a new training concept that UNICO is developing and currently is doing a try out on. It has its similarities to the current investigated concept where validation is included, but also involves the determination of what someone can. Grundfest (1969) highlights and means that it is vital to know and understand what the person who is to learn something already knows. This situation is a major part of UNICO's new concept, to be able to streamline teaching and not let people take part in education that they have already provided. Basically, it is about making maximum utilization of a trainees time in training, which is a really competitive approach.

6

Conclusions

The purpose of this study has been to investigate how UNICO's competence development processes corresponds to guidelines for Formative Assessment. By performing interviews with concerned parties such as two trainees at clients and one educator working at UNICO, similarities and differences between given and perceived information and instructions have been analyzed together with theory on Formative Assessment with some valuable aspects on competence development in general.

It has been shown that UNICO is working according to some directives for Formative Assessment, assumed they are unwittingly about it, which is a positive result.

Their process of giving trainees distinct, easily understood learning objectives for the course and its parts has the potential of becoming more clear, with the recommendation to specify information given. Also, UNICO should check up on if trainees understands the learning objectives.

The exercises given to confirm if the trainee has met set requirements for working with the software, has its foundation in a practical way of working which is seen as beneficial and provides the validator significant opportunities to hand over useful feedback for future work. In relation to mentioned literature, vital aspects is seen to have been fulfilled to a large extent.

The feedback given during the investigated competence development arrangement, has shown to be appreciated by those receiving it. Arguments for a positive response has been expressed to be because of the way feedback has been given; not just by saying "Good job with this assignment", instead explaining what and why something has been performed well. This have caused the trainees to realize their strengths and weaknesses in the software, helping them to focus their practical abilities at their workplaces.

Unfortunately, it has been shown that trainees usually takes a course individually in their early stage of employment, thus creating a learning context without peer trainees. As a thought for future training, it would be beneficial for UNICO to prepare activities that trainees could to together if a situation arises where more than one trainee is supposed to take the same course. Then, it could be a prosperous learning experience for new Catia-users helping and instructing others.

The last Formative Assessment strategy is to make the learner owner of its own learning. For the sake of this study, it has been discovered that trainees has been involved in and taken the initiative to develop their competence by taking a course, making UNICO's position and influence over this aspect neither to be approved nor complained about. In another case, with trainees somehow forced to take a course, perhaps UNICO has to take a mentoring role and work with motivation to make the best out of trainees participation.

References

Bjork Learning and Forgetting Lab (2018). Applying cognitive psychology to enhance educational practice. Online: Accessed 3 July 2018. `https://bjorklab.psych.ucla.edu/research/#spacing`.

Black, P. and Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, 5(1):7.

Black, P. and Wiliam, D. (2009). Developing the theory of formative assessment. *Educational Assessment, Evaluation and Accountability*, 21(1):5–31. `https://link.springer.com/article/10.1007%2Fs11092-008-9068-5`.

Blücher, D. (1999). *Att skapa förutsättningar för effektiv kompetensutveckling*. Mölndal: Institutet för verkstadsteknisk forskning (IVF).

Butler, D. L. and Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, 65(3):245–281. `https://doi.org/10.3102/00346543065003245`.

Dewey, J. (1958). *Democracy and Education*. New York: Macmillan.

Dilley, P. (2000). Conducting successful interviews: Tips for intrepid research. *Theory Into Practice*, 39(3):131.

Ellström, P.-E. and Kock, H. (2008). Competence development in the workplace: concepts, strategies and effects. *Asia Pacific Education Review*, 9(1):5–20. `https://doi.org/10.1007/BF03025821`.

English, M. C. W. and Visser, T. A. W. (2014). Exploring the repetition paradox: The effects of learning context and massed repetition on memory. *Psychonomic Bulletin & Review*, 21(4):1026–1032. `https://doi.org/10.3758/s13423-013-0566-1`.

Esaiasson, P., Gilljam, M., Oscarsson, H., Towns, A., and Wängnerud, L. (2017). *Metodpraktikan*. Stockholm: Wolters Kluwer.

Granberg, O. (2004). *Lära eller läras*. Lund: Studentlitteratur.

Grundfest, S. (1969). Educational psychology: A cognitive view. *Journal of Teacher Education*, 20(2):265–267.

Hansson, J. (2016). *Utveckla eller köpa kompetens*. Lund: Studentlitteratur.

Hattie, J. and Timperley, H. (2007). The power of feedback. *Review of Educational Research*, 77(1):81–112. https://doi.org/10.3102/003465430298487.

Herzberg, F. (1982). *The managerial choice: to be efficient and to be human.* Salt Lake City: Olympus Publ. Co.

Hirsh, Å. and Lindberg, V. (2015). Formativ bedömning på 2000-talet – en översikt av svensk och internationell forskning. Progress report. https://www.vr.se/analys-och-uppdrag/vi-analyserar-och-utvarderar/alla-publikationer/publikationer/2015-08-10-formativ-bedomning-pa-2000-talet.-delrapport.html.

Illeris, K. (2006). Lifelong learning and the low-skilled. *International Journal of Lifelong Education*, 25(1):15–28. http://proxy.lib.chalmers.se/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ721967&lang=sv&site=eds-live&scope=site.

Illeris, K. (2013). *Kompetens.* Lund: Studentlitteratur.

Jonsson, A., Lundahl, C., and Holmgren, A. (2015). Evaluating a large-scale implementation of assessment for learning in sweden. *Assessment in Education: Principles, Policy & Practice*, 22(1):104–121.

Kahneman, D. (2011). *Thinking, fast and slow.* New York: Farrar, Straus and Giroux.

Klapp-Lekholm, A., Norell, J.-O., Olsson, B., Pettersson, A., Samuelsson, I. P., Pramling, N., and Ridderlind, I. (2010). *Bedömning för lärande - en grund för ökat kunnande.* Stockholm: Stiftelsen SAF i samarbete med Lärarförbundet.

Kvale, S. and Brinkmann, S. (2014). *Den kvalitativa forskningsintervjun.* Lund: Studentlitteratur, 3 edition.

Lozic, V. (2018). Formativ bedömning stärker lärandet. Online: Accessed 26 June 2018. https://www.skolverket.se/skolutveckling/forskning-och-utvarderingar/forskning/formativ-bedomning-starker-larandet.

Maylor, H. (2010). *Project Management.* Harlow: Financial Times Pretice Hall.

Panadero, E. and Jonsson, A. (2013). The use of scoring rubrics for formative assessment purposes revisited: A review. *Educational Research Review*, pages 129–144. https://www.sciencedirect.com/science/article/pii/S1747938X13000109.

Pettersson, A., Tsagalidis, H., and Wernegren, D. (2011). Bedömning i yrkesämnen - dilemman och möjligheter. Online: Accessed 29 April 2018. https://www.skolverket.se/sitevision/proxy/publikationer/svid12_5dfee44715d35a5cdfa2899/55935574/wtpub/ws/skolbok/wpubext/trycksak/Blob/pdf2572.pdf?k=2572.

Phillips, D. C. and Soltis, J. F. (2014). *Perspektiv på lärande.* Lund: Studentlitteratur, 2 edition.

Rubenson, K. (2006). The nordic model of lifelong learning. *Compare: A Journal of Comparative Education*, 36(3):327–341. https://doi.org/10.1080/03057920600872472.

Skolverket (2018). Formativ bedömning. Online: Accessed 26 June 2018. `https://www.skolverket.se/undervisning/kallsidor/formativ-bedomning`.

Soderstrom, N. C., Kerr, T. K., and Bjork, R. A. (2016). The critical importance of retrieval–and spacing–for learning. *Psychological Science*, 27(2):223–230. `https://journals.sagepub.com/doi/pdf/10.1177/0956797615617778`.

Vingsle, C. (2014). *Formative assessment: Teachers knowledge and skills to make it happen.* Licentiand thesis, Umeå University, Umeå. `http://umu.diva-portal.org/smash/get/diva2:735415/FULLTEXT01.pdf`.

White, M. A. (1971). *The view from the student's desk.* New York: Holt, Rinehart and Winston.

Wiliam, D. (2011). *Embedded formative assessment.* Bloomington: Solution Tree Press.

A

Respondent Interview Guide

Bold text represents headlines/sections. *Italic text* represents potential comments and follow-up questions. Plain text is everything that is to be said to the respondent.

Introduction

The background of this interview, is that I am doing a master thesis work about successful factors for competence development, to evaluate how UNICO and their clients are working. I hope that we may have a constructive conversation about this, and that you feel that you have time to think and answer my questions.

I hope that it is fine by you if I record the interview with a dictaphone. All material produced - transcript and sound file - will be kept until the master thesis work is finished. When finished, the only savings will be the anonymous transcripts that will be used in the report. The rest will be deleted. I will name files with an index number to keep track of interviewees.

If you want to, you are free to abort your participation, and then I will delete all material collected from you immediately.

Just a short question before the real interview starts: What is your perception of this interview? What have you been told or asked before this?
I ask this to know your attitude.

Warm-up questions

First up, I would like to know...

What do you do as a professional? What's your work title?

How long have you been working in this role?

How long have you been working at the company in total?

What have you been doing before you started here?
Studies? Previous working places?

Questions related to UNICO and competence development

Now that we have talked about your current situation and background,
I would like to know what you think of when I say competence development?

What is your perception of competence validation or competence assessment?
How do you see that it may be performed?

Now I have some questions about your involvement in competence development activities arranged by UNICO.

Could tell me about training that you have been taking part of?
What was it about and how did you feel about it?

- How was it communicated?

- Goals
- Knowledge requirements / proficiency
- Feedback

- What do you feel that training efforts has given you?

- Has it shown what areas you need to improve on?
- What did you expect from it?
- How could it have been better?

Did the training cover your competence gap?
Did someone check if the gap was "covered"? How?

Did you get feedback on your progression?

Misc

How does your current employer make sure that you have the right set of skills to perform your work?

What do you feel is important for the/a organization to make employees dedicated to training?

What are your thoughts on how different employees may react/are reacting on competence development/training?

Do you have any other experience of competence development?

If you were the one to decide how competence development efforts were to be implemented; how would you arrange it?

- Who should be the "owner of the educational program"?
- How should it be communicated?
- Who should decide whom should be a part of the training?

- How should the competence development program be performed?
- How could it be confirmed that the training gives the desired result?

Is all this a question on confidence for the manager/organization? How come?

A couple of short questions in the end

How have you felt previous in school e.g., to be judged/evaluated?

What is your standing point when it comes to grades?

B

Informant Interview Guide

Bold text represents headlines/sections. *Italic text* represents potential comments and follow-up questions. Plain text is everything that is to be said to the respondent.

Introduction

The background of this interview, is that I am doing a master thesis work about successful factors for competence development, to evaluate how UNICO and their clients are working. I hope that we may have a constructive conversation about this, and that you feel that you have time to think and answer my questions.

I hope that it is fine by you if I record the interview with a dictaphone. All material produced - transcript and sound file - will be kept until the master thesis work is finished. When finished, the only savings will be the anonymous transcripts that will be used in the report. The rest will be deleted. I will name files with an index number to keep track of interviewees.

If you want to, you are free to abort your participation, and then I will delete all material collected from you immediately.

Well, lets get started!

Warm-up questions

What do you work with?

How long have you been working at this company in this role?

For how long have you been working at the company in total?

What have you been doing before you started here? *Studies? Previous working places?*

General aspects of competence development

Now, if we start with the big picture, or some general aspects if you want to call it that:

What do you thing of when I say 'competence development'?

What do you thing of when I say 'competence validation/assessment'?

Could you share some of you own experiences from competence development activities that you have been taken part of at different work places? *What has happened and what you have felt about it?*

To get into UNICO's way of working with competence development and competence validation:

In what ways are you (UNICO) working with competence development/educational activities?

How do you convey the entirety of your competence development activities? *Goals; Learning target(s)?*

To satisfy your clients ordering a competence development program, how do you covered what trainees is suppose to learn? *How do you follow it up?*

How does UNICO work with feedback?

Concerning your situation:

How does your employer make sure that you have the right competence to work with competence development? *Do they help you develop yourself?*

What do you think is important for an organization to have employees that value competence development activities?

In what ways do you think that employees may react on competence development activities? *What profiles have you met? How do you handle people with different attitude?*

——————————————————————————————————————

Towards the end, make sure that specific Formative Assessment steps has been talked about:

What information do you hand out to trainees in forehand, before a competence development activity?
How come; what is the purpose with it? How do you see that it affects learning? How do you present goals and learning targets?

How do you find out trainees competence level before a training program?

How do you show what the trainee learns during the training?

How do you work with feedback?
Do you give feedback? Is it always in the same way or does it vary?

What is your perception of trainees ability to work and learn from themselves?