

Learning Outcomes:
Revised Bloom's Taxonomy and Critical Thinking in
Two Examples of Unit Design

Satu Eskelinen
Master's Thesis
English Philology
Faculty of Humanities
University of Oulu
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1. Introduction

The beauty in learning is that it happens – anywhere, anytime, anyhow. The big question is how this innate disposition can be transferred into a more structural, often education-based acquisition of new skills and competences in a manner that keeps the learner passionate about learning. If described in a very simplified behaviouristic style, the instructed learning process aims at cutting down information into palatable chunks and a skill gets mastered through increasingly demanding sub-levels. The more holistic approaches integrate the learner and his/her world into the process of reaching expected learning outcomes. The learning professionals are guided in their work through curricula, both the national and local versions, which reflect the present educational theories and trends as well as with the educational experience and expertise, their persona, the teachers have themselves.

The shifting ideas and theories and their influence on present educational curricula remain at times vague to teachers. What lies at the core of the present curricula? How is the theory related to real life i.e. how is it relevant in classrooms? What are we expected to know about the theory behind curricula? How can we use the same theory in our own work - or can we? All in all, how do we bring theory into practise? This paper stems from a simple personal need to understand more elaborately at least some of these basic features and aims at finding use of the present syllabus design and its applications at work. The goal, in other words, is to clarify some aspects of the prevailing educational theory and give some examples on how theory transforms into practical classroom activities, assessment and evaluation.

In the fashion of prevailing theory, the modern classroom consists of individuals in the process of gaining personal educational targets or learning objectives set on place well in advance by the invisible facilitator, the teacher. The traditional model, where the active individual in the classroom was the teacher dealing out the needed information, is long gone. Learning theories, as provokingly set in two previous sentences, come and go as the answers on the nature of learning reflect the time they are set in. The 20th century witnessed an increasingly expanding interest in learning, education and its theory - the result of this process emphasizes the role of the learner. The object has become the subject both in the educational theory and the classroom. At the beginning of the new millennia, the learner is the core of the learning process where the expected learning targets - knowledge, skills and competences - are often given shape in the form of learning objectives.

In Finland, local curricula, with amongst other targets, gives tools in adjusting to the challenges and possibilities of globalisation, digitalisation, communication, lifelong learning to name but a few. The local curricula depend heavily on Finnish national syllabus which in turn is influenced

by guidelines drawn within the EU. The standardisation of reaching the expected learning targets or processes, a crude definition of learning outcomes, has become a platform for formulating qualifications. The European Qualifications Framework for Lifelong Learning (EQF) is a loosely set net to carry the national frameworks under one frame. The European Qualifications Framework has proven its value in transparency by setting various national qualifications to matching levels EU wide. Also, the educational theory within EQF reflects closely the present educational theory in wider context and provides a solid base for member countries to follow in national curricula. The major features of this work, Critical Thinking and Revised Bloom's Taxonomy, are in many ways integral EQF elements in its basic structures of which the Revised Bloom's taxonomy is pivotal amongst other clearly acknowledged modern educational influences while Critical Thinking -as considered in this work- has been more of an understated undercurrent.

The theoretical part starts with a concise, general look at the historical perspective of educational concepts. The paper then concentrates on the four features prominent in this work: European Qualifications Framework (EQF), Learning Outcomes (LOs), Revised Bloom's Taxonomy (RBT) and Critical Thinking (CT). Since the future is always around the corner, some information of the direction the theory and practice appear to be turning to will be discussed while connecting the previously discussed theory into present notions in education at national and international levels.

The chapter in analysis focuses on the two projects the writer has taken part of. The first example provides real life solutions in course/ module design following the EQF approach in the Erasmus + project for international student exchange in floristry. Another one shows CT in form and function and an account of a course plan for comprehensive school. The objective in analysis is to show through practical examples how two different applications of unit/course design work concurrently with curricula and provide ideas for creating study entities at school.

The final part of the paper steers at establishing the relation between the above-mentioned projects and the current curricula, discussing alternative approaches and the future of CT and RBT in both educational theory and practise. To sum it all up and to reflect the writer's personal view, Piaget (1988) managed to be both precise and confident in his statement: "The principal goal of education in the schools should be creating men and women who are capable of doing new things, not simply repeating what other generations have done; men and women who are creative, inventive and discoverers, who can be critical and verify, and not accept, everything they are offered."

2. Theory

The main educational theory-based interests in this work, Revised Bloom's Taxonomy (RBT) and Critical Thinking (CT), have not been formed in a vacuum. They have been influenced by previous and present educational, psychological and other humanistic fields of study. It is not only theory which has left its mark on RBT and CT - at the present time they reflect the values and expectations of the people of the 21st century.

The theories discussed here include Behaviorism, Humanism, Cognitivism and Constructivism. The concise take on these educational theories which have had their influence on RBT and CT is followed by an introduction to Learning Objectives (LOs) and corresponding features in modern educational theory. Learning Objectives are in focus of European Qualifications Framework (EQF) which is at the present time an influential educational and political framework for setting standards for educational levels which are often considered by concepts of knowledge, skills and competence.

2.1 Concise Introduction to Learning Theories

Modern psychology established itself within the scientific domain in the early 20th century as a science of examining, researching and understanding human mind and behaviour. While the 'hard' sciences had established themselves well before with scientifically measurable facts, it was through experiments on animal behaviour that early scientific research made its advances towards the educational theory known now as Behaviorism.

The very basic definition of Behaviorism is anything that an organism can do. This line of thought also follows the same idea as hard sciences in using observable and more measurable phenomena. Behaviorism can be characterised as *a study of actions* instead of researching less accountable behaviour e.g. feelings and thinking. This observable cause-and-effect relationship gave learning at that point a definition as a sequence of stimulus and response actions. Skinner, one of the major influences in Behaviorism and the firm spokesman for the approach of reinforced behaviour by the stimulus-response pattern, considered *learning as a function of change in overt behavior*.

The rise of radical behaviourism in the 1940s brought in the concept of positive reinforcement (Skinner, 1957) as the strategy for obtaining expected learning results and vice versa the influence of negative reinforcement in abandoning unwanted behaviour or learning. While the target groups in research were now people and their actions were considered more abstract, the idea of immediate presence of reinforcement or punishment echoed the original stimulus-response approach.

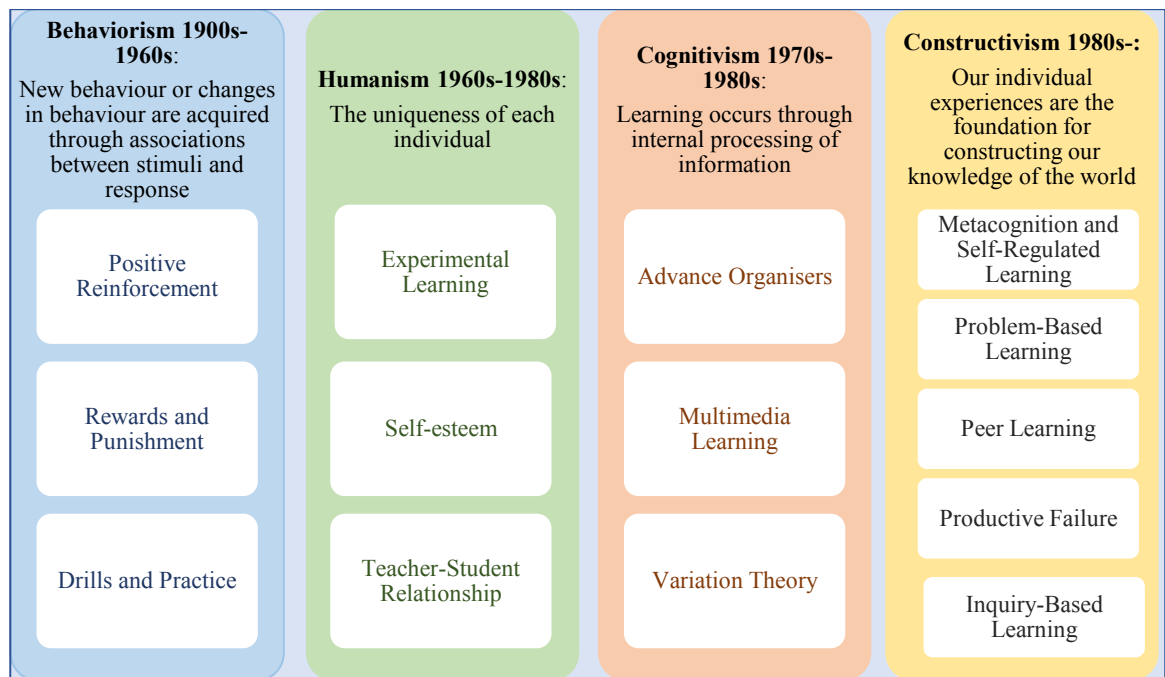


Figure 1 20th Century Learning Theories

Behaviorism had its limitations and, as the nature of science has, another theory was gaining momentum. Objectively, however, when considering learning per se, there are structures which are essential in the learning process; for example repetition, drills, practicing a skill in general are all important and unavoidable parts in gaining mastery in any discipline. The categorisation of these features as 'behaviorism' doesn't change the fact that stimuli-response behaviour exists even when the theory loses its fashion. While behaviorism has its uses in the modern classroom in for example as a method of mastering a skill with repetition it doesn't answer *how* the process happens in the learner - for example problem solving or creative thinking.

The following theories, Humanism, Cognitivism and Constructivism share in common the increasing focus on the learner and particularly the process the learner goes through in learning. Humanism, in contrast to Behaviorism, had its interest in on the individual and the study of subjective, not scientifically comparable experiences which lead to a new variety of methods of inquiry and a new set of values to understand the reasons behind our actions. Some of the important features in Humanism were the concept of free will and the consequences of actions, the uniqueness of every person at the same time as sharing the innate values of making the world a better place. (McLeod, 2015)

The strengths of Humanism also were its weakness - the concept of (overt) optimism in the good in people and the lack of precision as science gave the interpretation of invalidity in assessment, just to mention a couple reasons to object Humanism. In general, the lack of defined scientific reliability caused doubts about the whole field of study.

Cognitivism, with its name derived from cognition, in ways shows features of both the previously discussed theories. The human action is observed but not as a response to stimuli but instead as the structure of the thought process taking place caused by the stimuli. The changes in behaviour can be observed and measured following scientific principles but the purpose is to indicate the differences in internal mental processes. In Cognitivism, the idea of mirroring and accounting changes of the individual can be studied through the accountable and distinguishable patterns in behaviour.

The idea of *interaction in learning*, in contrast to the strong Behaviorist account of learning as a straightforward response to stimuli, emphasises people as rational beings. People need to be active participants in the learning process, learn from the surrounding environment and this can be explored in cognitivism through mental processes like thinking, memory, knowing and problem-solving. Bandura (1977) defines this behaviour as "observational learning or (modeling)" as he states that "most human behavior is learned observationally through modeling: from observing others, one forms an idea of how new behaviors are performed, and on later occasions this coded information serves as a guide for action" (Bandura, 1977). There are aspects in Cognitivism which still reflect the behaviorist stance of separating the individual from the action he/she takes, for instance the straightforward comparison of the mind to computer - certain outcomes follow from the process of incoming information.

The last one of the theoretical approaches introduced here and influencing the views behind RBT and CT is Constructivism. Constructivism is the theoretical approach which considers the learner being the creator of his/her reality. The direction of an individual takes in his/ her learning process depends on activeness, current/past knowledge, understanding and knowledge of the world. Constructivism has features of Cognitivism in its structure - the learner is the active centre - and for example the use of Socratic questioning is part of both Behaviorism and Critical thinking. So, the new theories build themselves on older ones; sometimes rejecting some of the major features as opposite to their own approach but at the same time accepting some ideas being useful in their definition of learning. Constructivism is large scale influence on the present educational theory and its impact from classroom practices to the content of present curricula is undeniable. The direction the theory is taking is an interesting thought and personally I would be happy to see more features of

the method in CT as defined in Paul-Elder Critical Thinking Framework (2001) influencing the educational theory.

2.2 Learning Outcomes (LOs)

Learning Outcomes or LOs are the hype of educational fashion. In many ways they are the outline for the method in which the modern educational design functions. In Europe, for example, countries belonging to EU are politically and legislatively drawn to follow European educational standards and have their national educational frameworks connected to the European qualifications framework which follows tightly the learning outcome -mindset. The learning outcome mentality reflects the other targets of preparing for future challenges both in Europe and at national levels. The shared targets of this EU-wide politically approved agreement, the use of learning outcomes in design, and the pressure to follow similar approach in national curriculum design as well pushes the local curricula design to the same direction. If the local curricula design is to follow the same standards in the outcome-based method, there should be more training and clear examples of how learning outcomes are to be used in a uniform manner.

Learning outcomes are not only a political standard but their 'real' purpose is to be a tool for advancing the learner based and targeted education. While these outcomes might be a project at local school, countrywide curricula, national standards for a vocational education they often follow a method called Revised Bloom's Taxonomy.

2.2.1 Learning Outcomes (LOs) and Instructional Objectives

The account on Learning outcomes follows the ideas presented in Cedefop (European Centre for the Development of Vocational Training 2017, European Commission). At the present, as pointed out earlier, learning outcomes (LOs) are the common nominator in setting the bar for improving quality and relevance in European education and training. Learning outcomes are considered important in clarification of programmes' and qualifications' intentions and helpful in working towards these expectations. One of the major benefits in the learning outcome approach is their versatility; learning outcomes can be used, for example, from the top levels of EU politics to designing a course at a local school in a small town in Finland.

One aspect for the use of learning outcomes is the greater transparency which offers the chance for policy-makers in education – locally, nationally and multinationally – also define targets,

processes and evaluation in uniform and neutral fashion. This makes the various national qualifications frameworks more comparable and homogenous.

While learning outcomes offer possibilities for more open and penetrable vision of a qualification or course there remain challenges in LO definitions and the actual writing processes. And after the challenge of writing LO's there are still important factors and processes left – defining learning outcomes is but the start where the actual implementation happens through teaching, learning and assessment.

So, what are these learning outcomes? The multitude of present pedagogical jargon is a humdrum for the novice. For example, learning outcomes seem to mix with competence, learning aims and learning objectives appear to be quite similar but not the same, how are learning outcomes related to Critical Thinking and Revised Bloom's Taxonomy – or was it Dreyfus taxonomy or has the SOLO (structure of observed learning outcomes) taxonomy replaced the previously mentioned ones?

The learning outcomes approach is increasingly the basis of occupational and educational standards, curricula, assessment criteria, qualifications descriptors and level descriptors in national qualifications frameworks (NQFs). In each of these instruments, learning outcomes are defined in different level of detail and they serve a number of purposes (e.g., setting the expectations about the capacities of a person having completed a qualification; guiding the teaching process; guiding the assessment process). Consequently, the formulation as well as the process leading to this formulation may differ according to the function for which the learning outcomes statement is designed. (Cedefop, 2018)

This modern definition of learning outcomes has not appeared out of thin air. In the 1960s and 1970s the idea of recording learning processes followed the idea of behaviorist theory in the form of behavioural objectives. Robert Mager introduced the idea of writing specific statements on observable outcomes and defined them as *instructional objectives*. The target was to define learning at the end of the process with the combination of instructional objectives and performance outcomes (Mager, 1975). The actual term *Learning Outcomes* had its first official definition by Eisner (1979) according to whom LOs were “essentially what one ends up with, intended or not, after some form of engagement”.

While this work uses 'learning outcomes' to describe the phenomenon of setting the learner in the focus of the learning process and the competence he/she is expected to have gained, there is a clear difference in the approach the two unit designs this work uses as examples. The unit design for Floristry follows the spirit of learning outcomes by EQF while the example in CT course design has

its structure defined by the strict form of instructional objectives. Since the scope of this work is quite limited, the decision to use the term 'learning objectives' has been adopted for most of the work.

Harden (2002), supporting the use of learning outcomes, listed the differences between the approaches in the following five points and arguing the choice of LOs against instructional objectives, which are stricter and demand more precision in function:

- The level of specification where the emphasis is placed: Learning outcomes are broad statements and are usually designed round a framework of 8-12 higher order outcomes.
- The classification adopted and interrelationships: The outcomes recognize the authentic interaction and integration in clinical practice of knowledge, skills and attitudes and the artificiality of separating these.
- The intent or observable result: Learning outcomes represent what is achieved and assessed at the end of a course of study and not only the aspirations or what is intended to be achieved.
- The ownership of the outcomes: A design-down approach encourages ownership of the outcomes by teachers and students.
- From practical point of view, the clarity and conciseness of learning outcomes makes them easier to write for the teacher, understand for the student and evaluate with more transparency.

2.2.2 Knowledge, Skills, Competence (KSC)

Learning objects have been attributed with the concepts 'knowledge', 'skills' and 'competence' for a few decades already. They are the description method and their categories by Revised Bloom's Taxonomy will be explained in 2.3.1.

The new, revised official definitions by European Council to be used in reference to EQF or national qualifications frameworks came out in May 2017. As stated above, the learning outcomes had previously been divided into Knowledge, Skills and Competence. Of these three, the third category, Competence, has been proven to be problematic. What exactly is competence? How can it be measured and assessed? How can it be observed objectively between different learners? To answer this discrepancy, adjustments were made to the original classification. The classifications and definitions of the basic key concepts in this work are from 'Official Journal of the European Union Council Recommendations' (2017) where learning outcomes, knowledge, skills, competence and the new category 'responsibility and autonomy' are defined as:

- '*learning outcomes*' means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and responsibility and autonomy;
- '*knowledge*' means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of

work or study. In the context of the EQF, knowledge is described as theoretical and/or factual;

- ‘*skills*’ means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);
- ‘*responsibility and autonomy*’ means the ability of the learner to apply knowledge and skills autonomously and with responsibility;
- ‘*competence*’ means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development;

The new category, *responsibility and autonomy*, replacing competence will take some time to find its place. While 'competence' was a difficult word for the intersection of knowledge and skills, its function in the present schema doesn't appear clearer either. It will be interesting to see the reactions on the educational field to this development of getting a fresh new category/name for a category while the original has a new job to do (with very little change).

While the new EQF standards have been defined and taken into use in national frameworks, it will take some time until the revision of the familiar categories of knowledge, skill and competence is complete with 'responsibility and autonomy' as an integral part of learning outcomes.

The following Figure 2 gives a clear idea of the diverse nature of KSC. The figure can be interpreted to describe both what any individual can find useful in the approach and simultaneously the large-scale targets of lifelong learning, competency-based learning, knowledge-based society show the EQF targets agreed upon EU.

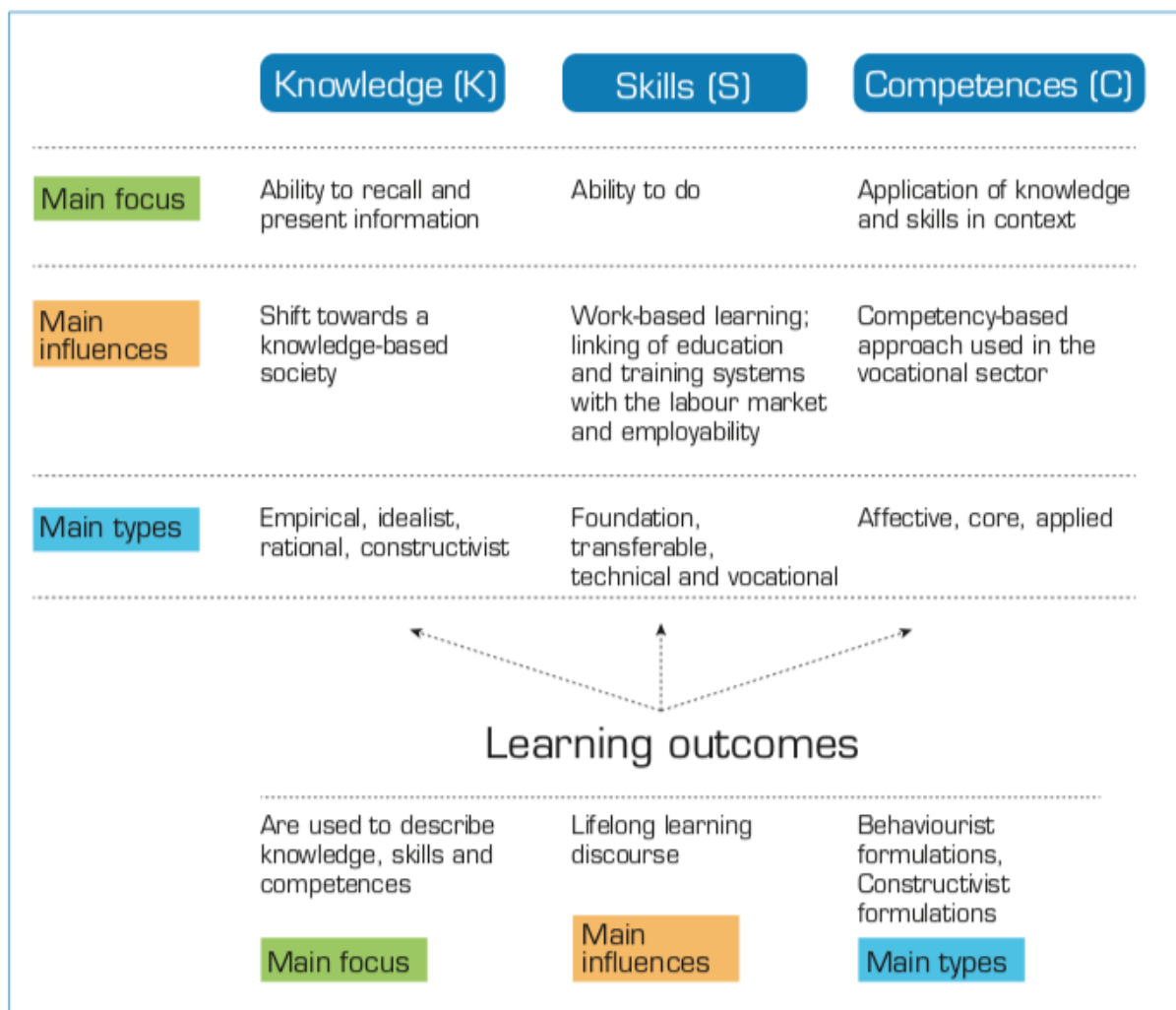


Figure 2 The manner in which learning outcomes are used to describe knowledge, skills and competences (Keevy & Chakroun, 2015)

2.3 Bloom's Taxonomy and Revised Bloom's Taxonomy (RBT)

There are two different versions of Bloom's Taxonomy. The first one refers to the original model formed from the 1960s to 1970s. The taxonomy has been widely used as a reference model for evaluation and course formulation. The Revised model from the turn of the century, often referred to as Krathwohl et al 2001 by the team behind the new model. The following account aims at distinguishing the two related taxonomies from each other and clarifying the differences between them. The Revised Taxonomy part compares the revised version to the EQF levels' model.

2.3.1 Description and influence of the original Bloom's taxonomy

Bloom's Taxonomy (in full 'Bloom's Taxonomy of Learning Domains' or more precisely Bloom's 'Taxonomy of Educational Objectives' or abbreviated as OBT in this work) has been a widely used theory model for educational targets and learning objectives. The original model, coined after the project leader Benjamin Bloom, was formed by a group of educational psychologists in the US in the 1950s.

The target for the taxonomy was to advance educational assessment and design by forming a system of categories for learning behaviour. Eventually the model, which was strictly speaking meant for developing new ways for *assessing college students' learning*, evolved into existing in many ways as the benchmark taxonomy in educational theory in the late twentieth century. Some of the major causes for the vast popularity have been the conciseness, ready set levels easy enough to follow in different societies and cultures and the ascending model of acquisition.

The original taxonomy was formed in stages. The cognitive domain (1956) was the first one followed by the affective domain (1964) and eventually by the psychomotor domain in the 1970s. While Bloom et al were in charge of the first two domains, the last one, the psychomotor domain has had several different approaches for example RH Dave (1967/70), EJ Simpson (1966/72), and AJ Harrow (1972).

These domains of Bloom's taxonomy have been a major influence in educational research, theory and practice since they have given the opportunity to categorize different aspects of acquisition comparatively. The division of the three domains of educational activities in Bloom's taxonomy introduces a hierarchy for describing different dimensions in learning in the following manner:

- **Cognitive**, describing *mental skills* (Knowledge)
- **Affective**, for *growth in feelings or emotional areas* (Attitude / Competence)
- **Psychomotor**, showing *manual or physical skills* (Skills)

These categories are often referred to as the KSA or KSC model (Knowledge, Skills and Attitude/Competence) and can be seen as *the targets of learning process* while the framework itself is a model for forming sets of expected or intended learning objectives. The affective dimension has furthermore often been attributed as **competence** which, even though quite abstract in itself, has been more accurate and applicable than 'Attitude'. The influence of the trinity of SKA/ SKO is clear on many of the educational frameworks, including the European Qualifications Framework (EQF) which is the multinational educational theory frame concentrated on in this paper.

The Cognitive Domain (Bloom, 1956) involves *knowledge and the development of intellectual skills*. The developing skills were classified by difficulty where the following, more

difficult level could be reached only after mastering the easier ones step by step. These levels from the easiest to hardest are

- **Knowledge**
- **Comprehension**
- **Application**
- **Analysis**
- **Synthesis**
- **Evaluation**

They are often shown in the form of a pyramid where the progressive knowledge ascends towards the top as shown on the figure below (the one contrasting OBT to RBT). As the model reached its form in a time when the focus in educational theory was shifting from teaching to learning and even though the categories had originally been created for university level students, the model resulted being one of the most influential educational standards discussing and determining levels of acquisition. This view of the progressive nature in acquisition is one of the weaknesses and major causes for criticism. The original model is also fundamentally rigid; performance can only be described by verbs at the corresponding level of acquisition or below it. Here, in Figure 3, the cognitive levels have been set on a staircase.

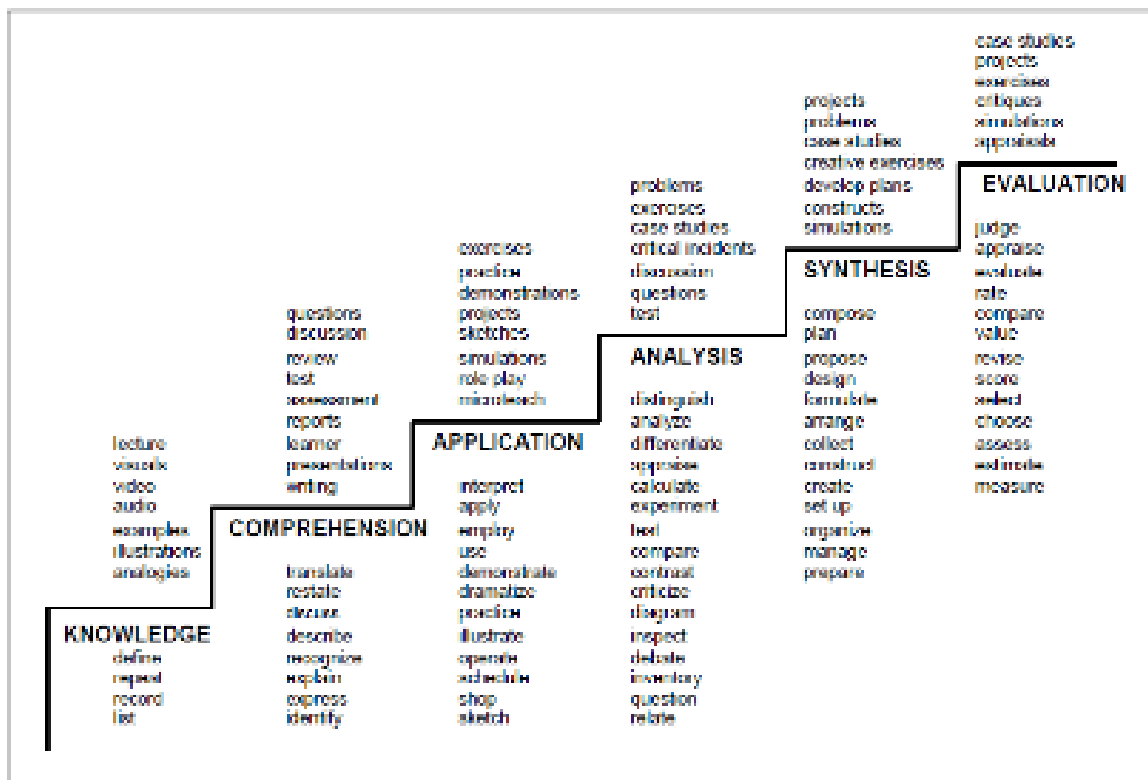


Figure 3 Bloom's Taxonomy staircase

(Source: <ftp://ftp-fc.sc.gov.usda.gov/NEDC/isd/taxonomy.pdf>)

The verbs applicable for the corresponding category help writing the intended learning objectives e.g. for the level 'Analysis' the matching verbs include 'distinguish', 'analyze', 'differentiate', 'appraise', 'calculate', 'test' etc. On the other hand, the examples describing the matching category elaborate concisely the learning targets and competences e.g. again for Analysis: problems, exercises, case studies, critical incidents, discussion, questions, test.

The affective domain (Krathwohl, Bloom & Masia, 1973) holds inside feelings, values, appreciation, complex skill that includes imitation and trial and error or adequacy of performance which is achieved by practicing' (Krathwohl, Bloom & Masia, 1973). What these corresponds to in real life is the competence to manage the intended (limited) learning target with supported instructions. Examples to make this clearer are for example to perform a mathematical equation as demonstrated or to follow instructions to build a model. Key words for guided response include: 'copies', 'traces', 'follows', 'reacts', 'reproduces', 'responds' enthusiasms, motivations and attitudes – *our manner of dealing with things emotionally*. Here, like with cognitive domain, the categories in the original model were listed from the simplest to the most complex: *Receiving Phenomena, Responding to Phenomena, Valuing, Organisation, and Internalising values (characterisation)*. The model was later adjusted and clarified with more detailed examples.

Psychomotor Domain (Simpson, 1972) was a later addition to the model to reflect the parts which had not been considered at the time of forming the very first target – a tool for assessing college level learning. So, to approach learning yet from another dimension the model was adjusted to include:

- **Physical Movement**
- **Coordination**
- **Use of Motor-skill Areas**

Development of these skills requires practice and is *measured in terms of speed, precision, distance, procedures, or techniques in execution.*

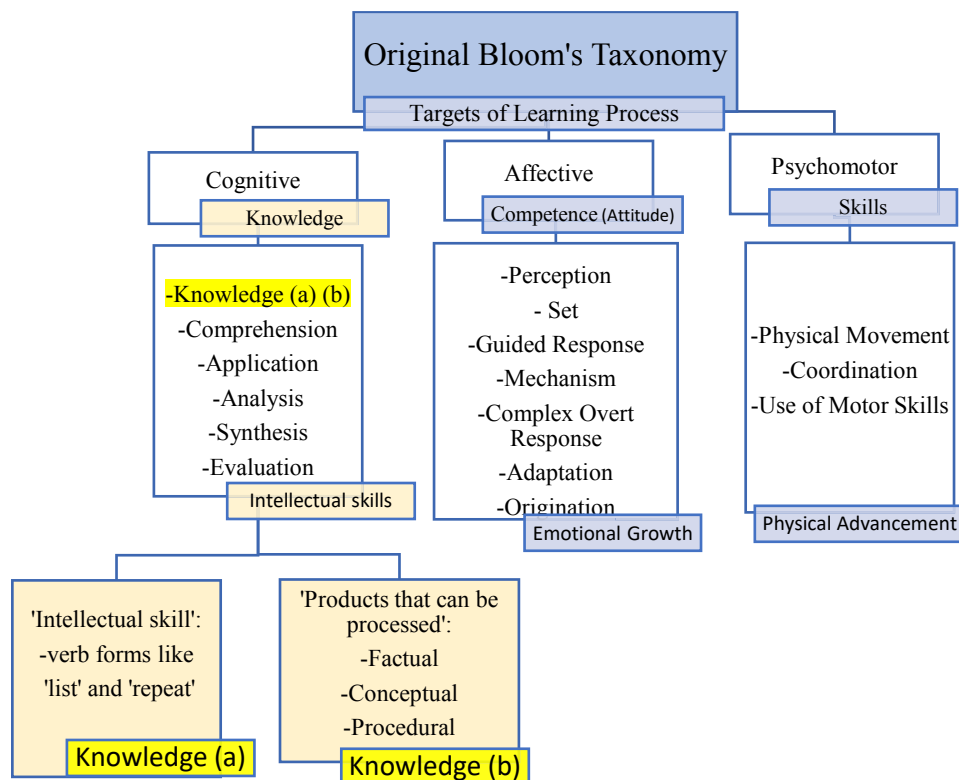


Figure 4: Original Bloom's Taxonomy and the two approaches to 'Knowledge'

Bloom's taxonomy is a deceptively simple and straightforward model. It appears to mince the learning process into clear bits which can be reached by following the predesigned steps and the model clearly shows its dependence to behaviorism. While there was a need to revise the model by the late 21st century, something in the core managed to capture some universal features since otherwise the taxonomy would have been long forgotten. The following Figure 4 collects the original Bloom's

taxonomy into one frame. The major underlying problems with 'Knowledge' have been marked in the table but explained in the next part, Revised Bloom's Taxonomy.

2.3.2 Revised Bloom's Taxonomy

While the 1950s original pyramid model had been getting additions in the affective and psychomotor domains to reflect the changes and evolvments in research, the original model was considered outdated and not responding to the state-of-the art in educational theory and research by the 1990s. The revision of the original model was led by Lorin Anderson, Bloom's former student, and the resulting Revised Bloom's Taxonomy (2001) leads towards a model manifesting a more active form of thinking and is generally considered to be more accurate at that aim.

Even though these changes may appear almost cosmetic at first sight they, however, involve **major internal changes** in the pyramid model by

- (1) slightly **rearranging** the order of the six levels in cognitive domain and
- (2) changing the cognitive domain levels' *names from noun to verb forms*.

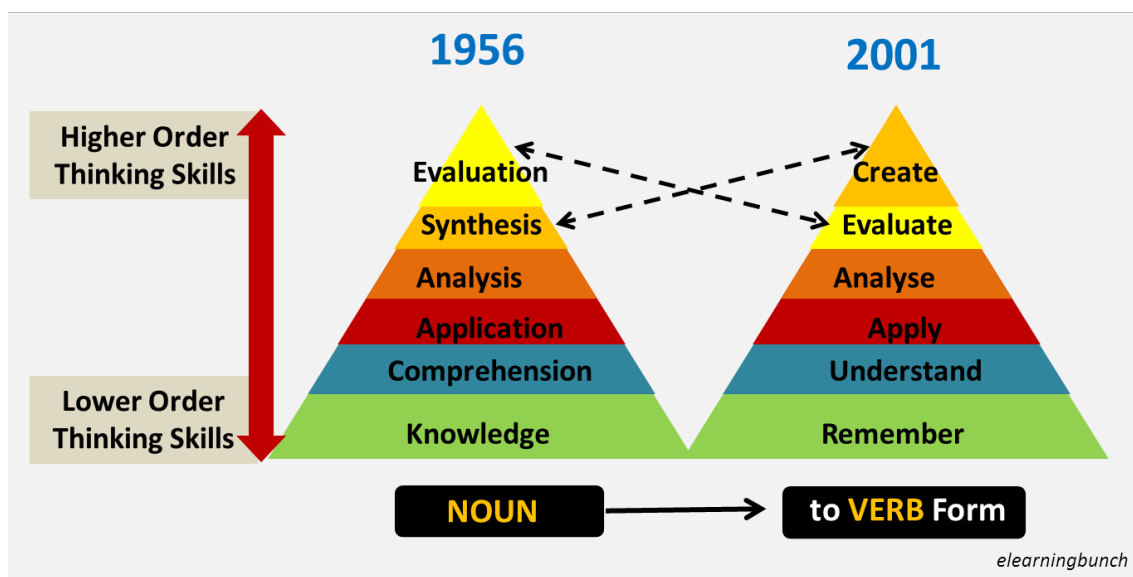


Figure 4 The differences in Original Bloom's Taxonomy and Revised Bloom's Taxonomy

The lowest category in cognition, Knowledge, had been a cause for primary internal problems in the original Bloom's taxonomy. Within the original taxonomy, 'Knowledge' as a word

- described directly one of the **categories** in the pyramid (cognitive domain) (Knowledge (a) in Figure 4) but

- from another viewpoint the OBT Knowledge also divided **description levels** into *factual, conceptual and procedural knowledge* (Knowledge (b) in Figure 4).

Thus, within the original taxonomy, the corresponding verb to form 'Knowledge' showed one dimension e.g. 'list', 'repeat' while the category 'Knowledge' itself was determined in these three above mentioned description levels. Thus, unlike the other cognitive categories, *this particular category had a dual existence*. The Revised Taxonomy addressed these underlying discrepancies and solved them in the following manner.

The first alteration of RBT was to *change the name of this lowest order thinking skill* (or 'Intellectual Skill' as in Knowledge (a) in Figure 4.), beside the universal change to start using verbs instead of nouns, *from knowledge to remember*. The word 'knowledge' describes an outcome or product of thinking, not a *form of thinking* and as such wasn't a correct name for a category in the same way as 'remember'.

While Bloom's original cognitive taxonomy did mention three levels of knowledge or 'products that could be processed' (Knowledge (b) in Figure 4.), they were not elaborated further in OBT and remained one-dimensional and imprecise. The levels of knowledge are described in Revised Bloom's taxonomy in the following manner:

- **Factual** - The basic elements students must know to be acquainted with a discipline or solve problems.
- **Conceptual** – The interrelationships among the basic elements within a larger structure that enable them to function together.
- **Procedural** - How to do something, methods of inquiry, and criteria for using skills, algorithms, techniques, and methods.

The major change in the underlying theory within the taxonomy was drawn into the revised version by Krathwohl and Anderson et al. (2001) by *combining the cognitive processes of the pyramid (Remember, Understand, Apply, Analyse, Evaluate, Create) with the above-mentioned three levels of knowledge (Factual, Conceptual, Procedural) into a matrix*. In addition, Krathwohl and Andersen supplemented the matrix with another level of knowledge - metacognition:

- **Metacognitive** – Knowledge of cognition in general, as well as awareness and knowledge of one's own cognition.

The structure of the *knowledge dimension* in the RBT includes the four different levels which in many ways follow the general idea within the taxonomy of easy-hard approach. While it is possible for the learner to acquire features of for example procedural knowledge, the acquisition by large follows the path from factual to metacognitive.

Factual	Conceptual	Procedural	Metacognitive
<ul style="list-style-type: none"> • knowledge of terminology • knowledge of specific details and elements 	<ul style="list-style-type: none"> • knowledge of classifications and categories • knowledge of principles and generalizations • knowledge of theories, models, and structures 	<ul style="list-style-type: none"> • knowledge of subject-specific skills and algorithms • knowledge of subject-specific techniques and methods • knowledge of criteria for determining when to use appropriate procedures 	<ul style="list-style-type: none"> • strategic knowledge • knowledge about cognitive tasks, including appropriate contextual and conditional knowledge • self-knowledge

Figure 6: The knowledge dimension (affective strategies) (Revision of Bloom’s taxonomy, n.d)

The same categories of the affective strategies are drawn together with the cognitive processes in the matrix in Figure 7.

The Cognitive process itself and its dimensions were rethought and rebuilt in the Revised taxonomy model. The categories in RBT include 19 cognitive processes along a continuum from the most basic to the most complex. In the Revised Taxonomy, according to Krathwohl, these cognitive processes are actually considered to be more important than the six description categories they are labelled with. This is a detail which has not been given a lot of attention while the categories themselves have become widely accepted as description units of developing thinking skills.

The Cognitive categories and processes in Revised Bloom's Taxonomy:

- **Remember:** Recalling, Recognizing
- **Understand:** Interpreting, Exemplifying, Classifying, Summarizing, Inferring, Comparing, Explaining
- **Apply:** Executing, Implementing
- **Analyze:** Differentiating, Organizing, Attributing
- **Evaluate:** Checking, Critiquing
- **Create:** Generating, Planning, Producing

The major revision in the new taxonomy model was uniting the two dimensions, cognitive processes and knowledge dimension, while introducing more extensive and specific subcategories within the entire matrix. The following Figure 7 exemplifies on how performance-based objectives can be formed using the two-dimensional taxonomy. One of the benefits of the model is its visual clarity – the more complex and demanding the learning objective is, the higher it rises in the retake of the

pyramid model. Simultaneously, to reflect closer the learning process, the complexity of the Knowledge dimension is lifted directly into the model so that the dimensions stretch from the easily understandable factual knowledge to the metacognitive, a level much harder to grasp and obtain.

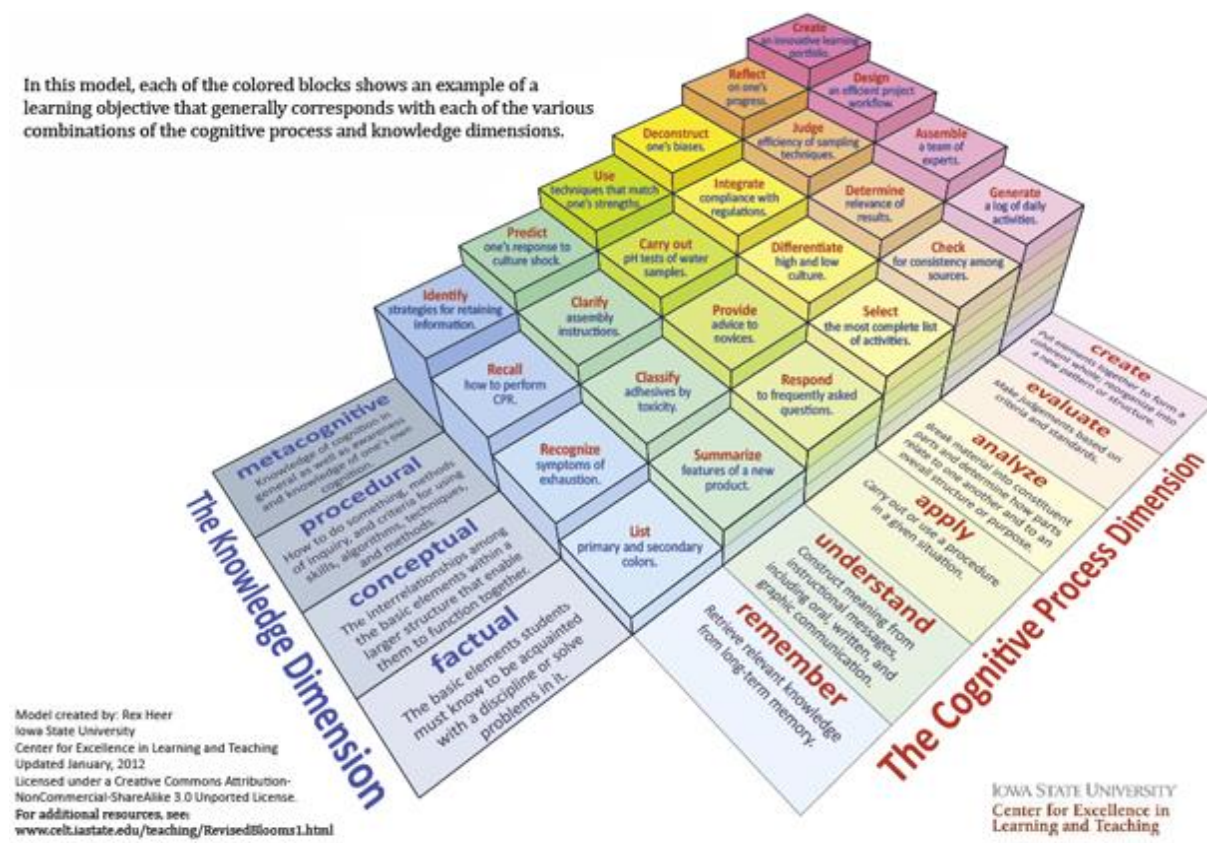


Figure 7: Taxonomy for learning, teaching, and assessing: a revision of Bloom’s Taxonomy of Educational Objectives.

The Revised Bloom’s Taxonomy meets educational targets from several directions with its adaptability in forming learning objectives. On the highest level it functions as a tool for setting multinational guidelines as in European Qualifications Framework and at the most precise level the taxonomy helps form classroom practises and student advancement by giving tools in writing straightforward learning objectives. In the practical part, the learning units in floristry were created under the influence of EQF and formed by following the cognitive processes and affective levels, or more precisely the verb forms corresponding relevant cognitive processes and affective levels. While the previous Figure 7 targets at explaining and elaborating both the structure of the revised taxonomy and the method of forming learning outcomes it has its practical applications in revising and evaluating the resulting outcomes of a project, unit or any study entity. The model functions in both its dimensions in defining whether:

- a) the resulting learning outcomes are corresponding to targeted levels in cognitive processes
- b) the study entity reflects and answers to all the levels in the knowledge domain.

In the following, descriptors defining levels in the European Qualifications Framework (EQF) will be presented. Each of the 8 levels is defined by a set of descriptors indicating the learning outcomes relevant to qualifications at that level in any system of qualifications.

	Knowledge	Skills	Responsibility and autonomy
	In the context of EQF, knowledge is described as theoretical and/or factual.	In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).	In the context of the EQF responsibility and autonomy is described as the ability of the learner to apply knowledge and skills autonomously and with responsibility
Level 1 The learning outcomes relevant to Level 1 are	Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context
Level 2 The learning outcomes relevant to Level 2 are	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
Level 3 The learning outcomes relevant to Level 3 are	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
Level 4 The learning outcomes relevant to Level 4 are	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
Level 5 ^[1] The learning outcomes relevant to Level 5 are	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
Level 6 ^[2] The learning outcomes relevant to Level 6 are	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups

	Knowledge	Skills	Responsibility and autonomy
	In the context of EQF, knowledge is described as theoretical and/or factual.	In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).	In the context of the EQF responsibility and autonomy is described as the ability of the learner to apply knowledge and skills autonomously and with responsibility
Level 7 ^[3] The learning outcomes relevant to Level 7 are	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
Level 8 ^[4] The learning outcomes relevant to Level 8 are	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

1. The descriptor for the short cycle developed by the Joint Quality Initiative as part of the Bologna process, (within or linked to the first cycle), corresponds to the learning outcomes for EQF level 5.
2. The descriptor for the first cycle corresponds to the learning outcomes for EQF level 6.
3. The descriptor for the second cycle corresponds to the learning outcomes for EQF level 7.
4. The descriptor for the third cycle corresponds to the learning outcomes for EQF level 8.

Figure 8 Descriptors Defining European Qualifications Framework (EQF) (Source: <https://ec.europa.eu/ploteus/en/content/descriptors-page>)

Another application of RBT deep within the European Qualifications framework is the transfer method. EQF sets the qualifications at eight different levels which are defined in learning outcomes. As there are only five categories of RBT, the lower categories define often lower levels in EQF and likewise the highest categories the most demanding levels of acquisition. For example, the level after comprehensive school is EQF level 2, during secondary education EQF level 3 and at the graduation of secondary education EQF level 4. The figure 9 below shows the Finnish framework for

qualifications and other competence modules at the present time. Comparing the two figures together gives a good idea of the correspondence between the figures.



Figure 9 National Framework for Qualifications and Other Competence Modules in Finland

Finland joined in European Qualifications Framework late in the process, only in 2017, but has been intensively included in the preparation of standards and practices of EQF. It has rather been a political decision not to proceed with joining in the framework while the national board of education has been involved with keeping the up-to-date model of the EQF even before Finland officially joined in. The last appendix gives a detailed account of the Finnish national qualification framework and how it is connected to EQF.

2.4 Critical Thinking (CT)

The first idea for this paper came to me during the course I took on Critical Thinking. Many of the concepts felt like they were already part of my teaching philosophy but I hadn't realised they were there or that the ideas I had had actually existed in education. The Paul-Elder Critical Thinking Framework which is the CT basis here was introduced in 2001 "in order to improve the critical thinking process through understanding the parts of the reasons and provide a method to evaluate it". There was plenty of material I wasn't familiar with but even though the approach, especially the underlying theoretical part with Elements of Thought, Intellectual Standards and the enormous list of Cognitive strategies, took a lot of time and revision before some of it and the internal connections started making sense. The next two parts attempt to distinguish the tentacles of Critical Thinking and how the interrelated connections function.

2.4.1 The Two Faces of Critical Thinking

'The ability to take charge of one's own thinking and to pursue it further' (Holec 1981) is one way of describing learner autonomy and in this respect within this work critical thinking as well. To give critical thinking a definition through personal experience bears - as an example - similarities to describing a misty morning. We describe the same collectively shared phenomenon where each and every account has its own details and interpretations on whether the morning was sunny, warm, the mist still or moving and so on. Beside describing the physical phenomenon people would include details varying on their age, sex, background and so forth. The collective image has its private unique interpretations.

In a similar manner, it is by personal experience (including education), intelligence and choice how we teachers integrate different learners in classes, evaluate our own or student competence or performance, create a brand-new project with colleagues - or decide against getting involved with. Knowingly or unconsciously we apply some practices of critical thinking in our everyday lives. The principles of critical thinking we consider ourselves advocating and using objectively do not exist in a vacuum. We are equally influenced by time and place, the society we live in, its values and influences at the present time. While it may be easier to see the pressure, other people negate with and against and how they sometimes choose against their personal values and integrity, it takes far more courage and self-awareness to acknowledge similar behaviour in ourselves and even more to make a change.

The theory of Critical Thinking does not, however, correspond exactly to the general idea of 'thinking critically'. In ways, thinking critically contrasts to the aims in CT: at least in Finland thinking critically carries an undercurrent a negativity and being critical appears to translate to opposing the generally accepted balanced truths and conventions in society in a personally biased, unjustified style: being critical is being negative, sarcastic and contra-productive. On the other hand, critical thinking can be described more positively as an internal quality or approach which corresponds to pragmatism - a very Finnish approach to problem solving. None of these considerations on the structure of critical thinking consider CT as a method or a field of study. Against this background it takes some effort to fashion CT as a philosophical theory, a structural approach in gaining awareness, fairness and objectivity in individual decision making and on a general level promoting equality and transparency in society.

Critical Thinking as a theory and a field of study in its modern form originates in the United States in the mid-late 20th century. The roots of critical thinking can be traced back to ancient Greece, almost 2500 years ago, where Socratic questioning was formed and used and can be considered as one part of critical thinking or its predecessor. From the mid-20th century onwards many of the descriptions of critical thinking are partly overlapping, partly focusing on their particular approach. The first of the rising tide in 1941 was Edward Glaser who, in his still influential study on critical thinking and education, formulated:

The ability to think critically [...] involves three things: (1) an attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences, (2) knowledge of the methods of logical inquiry and reasoning, and (3) some skill in applying those methods. Critical thinking calls for a persistent effort to examine any belief or supposed form of knowledge in the light of the evidence that supports it and the further conclusions to which it tends. It also generally requires ability to recognize problems, to find workable means for meeting those problems, to gather and marshal pertinent information, to recognize unstated assumptions and values, to comprehend and use language with accuracy, clarity, and discrimination, to interpret data, to appraise evidence and evaluate arguments, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations, to put to test the conclusions and generalizations at which one arrives, to reconstruct one's patterns of beliefs on the basis of wider experience, and to render accurate judgments about specific things and qualities in everyday life''.

Another, even more exhaustive but thorough list of qualities is by Michael Scriven and Richard Paul (1987) when they state:

Critical thinking is the intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values

that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.

As seen in the two previous excerpts, to cover critical thinking in one's own words is but a challenge and to perceive its dimensions by definition can appear overwhelming. Amongst the plethora of definitions on CT there are also those, which - in contrast to the two, fair but distant, more academic takes above - are those that describe critical thinking in a manner that corresponds to the values and ideals of in many modern societies. In 1987 Linda Elder outlined in her account:

Critical thinking is self-guided, self-disciplined thinking which attempts to reason at the highest level of quality in a fair-minded way. People who think critically consistently attempt to live rationally, reasonably, empathically. They are keenly aware of the inherently flawed nature of human thinking when left unchecked. They strive to diminish the power of their egocentric and sociocentric tendencies. They use the intellectual tools that critical thinking offers – concepts and principles that enable them to analyse, assess, and improve thinking. They work diligently to develop the intellectual virtues of intellectual integrity, intellectual humility, intellectual civility, intellectual empathy, intellectual sense of justice and confidence in reason. They realize that no matter how skilled they are as thinkers, they can always improve their reasoning abilities and they will at times fall prey to mistakes in reasoning, human irrationality, prejudices, biases, distortions, uncritically accepted social rules and taboos, self-interest, and vested interest. They strive to improve the world in whatever ways they can and contribute to a more rational, civilized society. At the same time, they recognize the complexities often inherent in doing so. They avoid thinking simplistically about complicated issues and strive to appropriately consider the rights and needs of relevant others. They recognize the complexities in developing as thinkers, and commit themselves to life-long practice toward self-improvement. They embody the Socratic principle: *The unexamined life is not worth living*, because they realize that many unexamined lives together result in an uncritical, unjust, dangerous world.

After the three exhaustive takes on the nature of CT, Norris (1985) manages to squeeze CT into a diamond in his definition (and also takes a hit on Shakespeare) by the fantastically minimal but precise: Critical thinking is deciding rationally what to or not to believe.

The previous, philosophy-based accounts of Critical Thinking can be enriched with other models which approach critical thinking with discipline-specific elements. In education, the 20th century learning theories behaviorism, cognitivism, constructivism and humanism all bear aspects of critical thinking in their core. Here, to simplify, the starting point lies with behaviourism and the stimulus creating teacher using Socratic questioning in the classroom. At the present time of the continuum both constructivism and humanistic learning theory set the learner in focus and support schools providing opportunities for pupils to discover themselves as active learners and master reflective thinking skills to access their own strengths and to acquire the ability for self-discipline.

CT doesn't only refer to an approach for any individual but is an important method for teachers in the development of classroom practices towards more active and inquisitive learners. The

following Figure 10 gives some ideas on how important the role of the teacher as a facilitator in the changing conditions is.

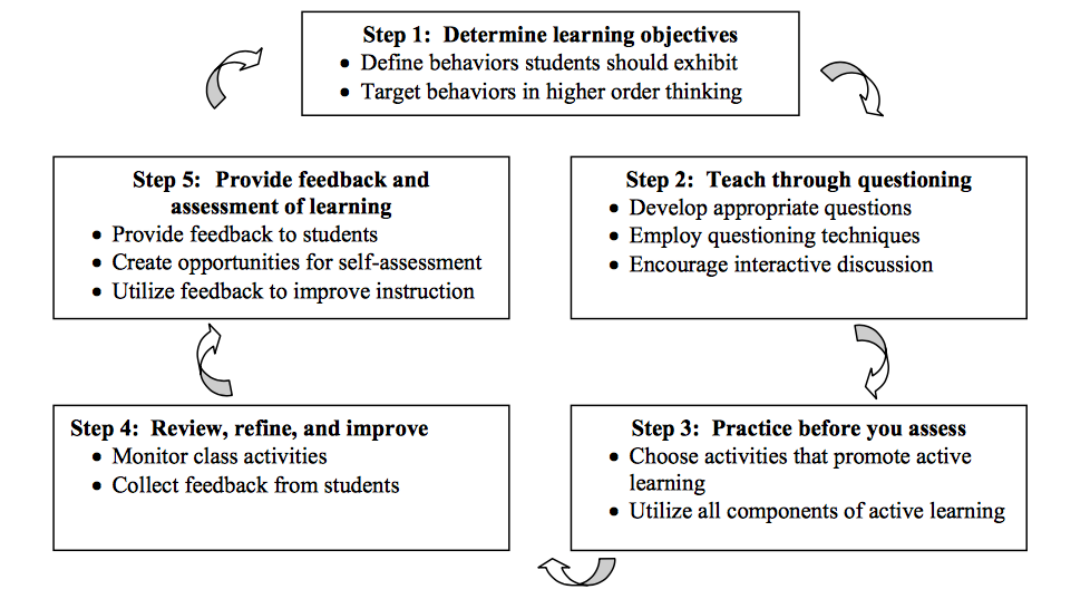


Figure 10 5-step Model to Move Students towards Critical Thinking

2.4.2 Instructional objectives in Critical Thinking

When Critical Thinking is used as a method in educational design, the approach differs quite clearly from the EQF model with Revised Bloom's Taxonomy in its core. While the RBT is also an integral part of CT approach, the models follow different logic. Critical Thinking in educational design rather uses instructional objectives, which in many aspects are close to learning outcomes. And as pointed out earlier in 2.2.1 this work in general uses the concept 'learning outcomes' but here, to show the internal structure within CT logic, it is justified to refer to instructional objectives.

Critical thinking as model for structural course design is quite strict with the main points of definition used in forming the unit plan. It is important to understand that underneath the instructional objectives approach there exists **the basic set of theory** which is expected to be internalised by its CT users. These two are called *Elements of Thought and Intellectual Standards*. The first part of the theory entails the basic assumption within CT that **all thinking is based on eight basic components**; these structures are called **Elements of Thought**. The account of theory behind Critical Thinking here follows the Paul-Elder framework (Paul and Elder, 2001). Elements of thought can be used to **classify thinking**.

For example, in order to be able to find answers to issues and problems we face, we make our decisions based on our prior assumptions and experience using various concepts, ideas and theories. Based on *the set of eight elements of thought*, it is possible to divide ‘thinking’ into *sub-categories which generate purposes, raise questions, use information, utilize concepts, make inferences, make assumptions, generate implications or embody a point of view*. The elements of truth are shown also in the previous figure 9 which can be accessed by <https://www.criticalthinking.org/ctmodel/logic-model1.htm>. The link opens up to an interactive chart showing the elements of thought and gives detailed account of their use in real life by sets of questions.

To Analyze Thinking We Must Identify and Question its Elemental Structures

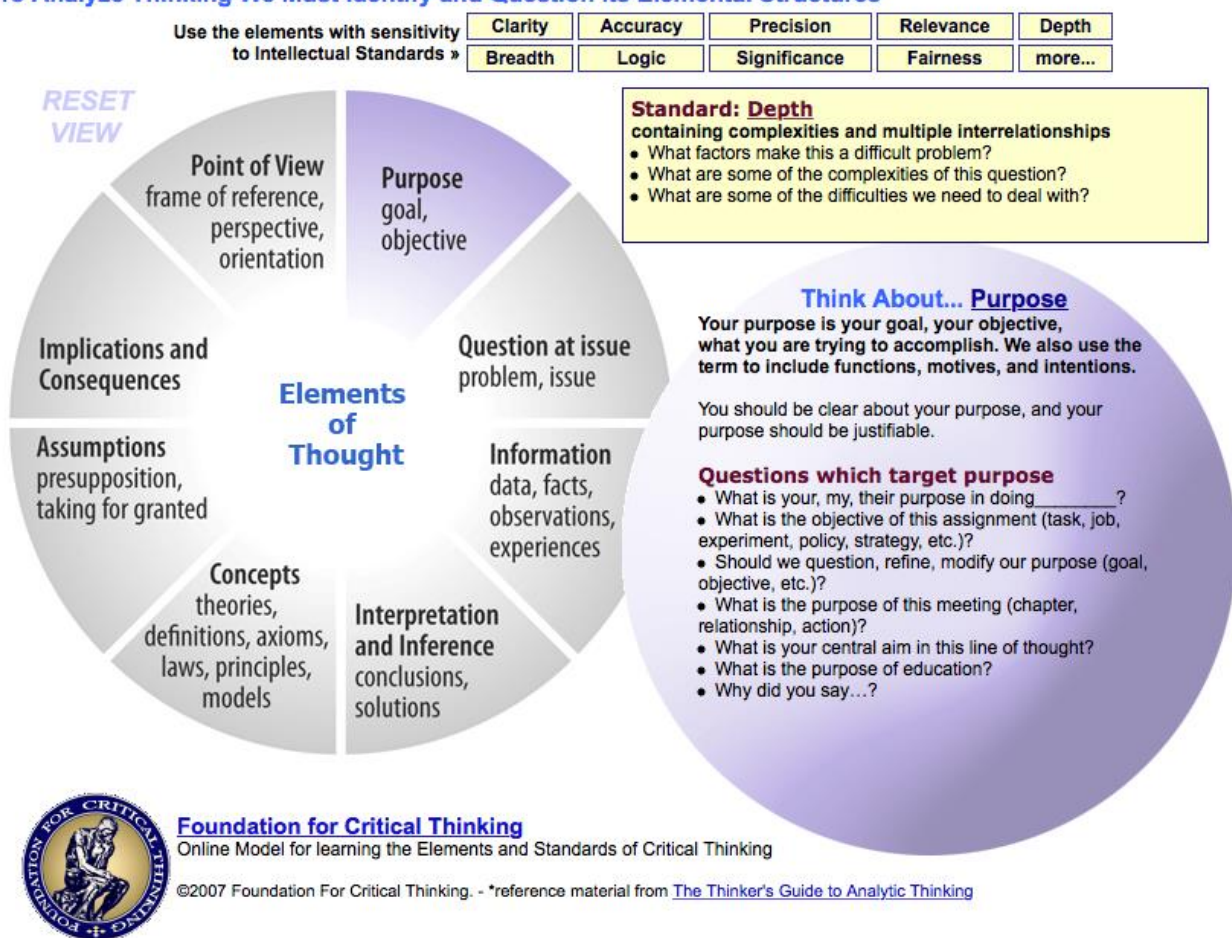


Figure 11 Elements of Thought and Intellectual Standards

Although the Paul-Elder framework brings along there is a lot of interconnected theory and material that appears to swarm over to any possible direction, what makes the Elements of Thought figure more understandable for a beginner is the list of questions directed to clarify both the category itself

and the intention of action one carries out within the scope of a particular category. As an example, the above-described 'Assumptions' can be approached by the following questions:

- What am I assuming or taking for granted?
- Am I assuming something I shouldn't?
- What assumption is leading me to this conclusion?
- What is... (this policy, strategy, explanation) assuming?
- What exactly do sociologists (historians, mathematicians, etc.) take for granted?
- What is being presupposed in this theory?
- What are some important assumptions I make about my roommate, my friends, my parents, my instructors, my country?

The other pivotal part of CT theory is the set of **Universal intellectual standards** which are intended to be used to **probe the validity of own thinking** or 'which must be applied to thinking whenever one is interested in checking the quality of reasoning about a problem, issue, or situation. To think critically entails having command of these standards. To help students learn them, teachers should pose questions which probe student thinking; questions which hold students accountable for their thinking; questions which, through consistent use by the teacher in the classroom, become internalized by students as questions they need to ask themselves' (Paul 1990)'. The ultimate goal, then, is for these questions to become infused in students' own thinking, forming part of their inner voice, which hopefully lead them to better and more detailed reasoning. While there are many universal standards, the following are the most essential ones: **Clarity, Accuracy, Precision, Relevance, Depth, Breadth, Logic, Fairness.**

In the previous Figure 11, it is not only elements of thought that critical thinking requires for revealing the underlying structures in thinking. Answering the questions defining any or several intellectual standards reveal the level of reasoning skills and help forming a well-balanced attitude to facing new information or defending own opinion when needed. The list of questions defining the categories can be found in the appendix or directly on the net at <http://www.criticalthinking.org/pages/universal-intellectual-standards/527>.

While Revised Bloom's Taxonomy has The Cognitive categories and processes, Critical Thinking divided the cognitive strategies into the following list:

A. Affective Strategies

S-1 thinking independently

S-2 developing insight into egocentricity or sociocentricity

S-3 exercising fairmindedness

- S-4 exploring thoughts underlying feelings and feelings underlying thoughts
- S-5 developing intellectual humility and suspending judgment
- S-6 developing intellectual courage
- S-7 developing intellectual good faith or integrity
- S-8 developing intellectual perseverance
- S-9 developing confidence in reason

B. Cognitive Strategies - Macro-Abilities

- S-10 refining generalizations and avoiding oversimplifications
- S-11 comparing analogous situations: transferring insights to new contexts
- S-12 developing one's perspective: creating or exploring beliefs, arguments, or theories
- S-13 clarifying issues, conclusions, or beliefs
- S-14 clarifying and analyzing the meanings of words or phrases
- S-15 developing criteria for evaluation: clarifying values and standards
- S-16 evaluating the credibility of sources of information
- S-17 questioning deeply: raising and pursuing root or significant questions
- S-18 analyzing or evaluating arguments, interpretations, beliefs, or theories
- S-19 generating or assessing solutions
- S-20 analyzing or evaluating actions or policies
- S-21 reading critically: clarifying or critiquing texts
- S-22 listening critically: the art of silent dialogue
- S-23 making interdisciplinary connections
- S-24 practicing Socratic discussion: clarifying and questioning beliefs, theories, or perspectives
- S-25 reasoning dialogically: comparing perspectives, interpretations, or theories
- S-26 reasoning dialectically: evaluating perspectives, interpretations, or theories

C. Cognitive Strategies - Micro-Skills

- S-27 comparing and contrasting ideals with actual practice
 - S-28 thinking precisely about thinking: using critical vocabulary
 - S-29 noting significant similarities and differences
 - S-30 examining or evaluating assumptions
 - S-31 distinguishing relevant from irrelevant facts
 - S-32 making plausible inferences, predictions, or interpretations
 - S-33 giving reasons and evaluating evidence and alleged facts
 - S-34 recognizing contradictions
 - S-35 exploring implications and consequences
- (<http://www.criticalthinking.org/pages/strategy-list-35-dimensions-of-critical-thought/466>)

Now, the basic concepts have all been introduced in all of the lists and tables above. They can be quite some work to get to be internalised, but learning to use them it is possible that the following characteristics, **Intellectual Traits**, may develop:

Intellectual Humility

This trait develops one's ability to perceive the known limitation and the circumstances that may cause biases and self-deceptively. It depends on recognizing that one claims what one's actually knows.

Intellectual Courage

Courage represents developing a consciousness to address ideas fairly regardless its point of

view or our negative emotions about it. Also, it helps us to develop our ability to evaluate ideas regardless our presumptions and perceptions about it.

Intellectual Empathy

Empathy is related to develop the ability to put ourselves in the others' shoes in order to understand them. also, it develops how we can see the parts of reasoning of the others such as the viewpoints, assumptions, and ideas.

Intellectual Integrity

This part is related to develop the ability to integrate with others intellectual reasoning and avoid the confusion that comes from our own reasoning. Unlike the empathy, integrity focuses on the ability to others' reasoning for the topic and integrate with it.

Intellectual Perseverance

The perseverance develops the need to have the truth about the insight regardless the barriers that face against it such as difficulties, frustration, and obstacles. this helps us to build rational reasoning despite what is standing against it.

Confidence in Reason

By applying the reasoning parts and encouraging people to come with their reasons, they start to build confidence in their reason and think in a rational way.

Fair-mindedness

This trait develops the ability to start with a fair look at all the reasoning and traits all the viewpoints alike putting aside one's feelings, raises, and interests

Earlier on giving the CT definition by Michael Scriven and Richard Paul (1987) their take on CT seemed quite theory-based - and that is what it is! It is referring to the above mentioned theory and as the CT is a process with detailed sublevels, this is how the Paul-Elder Critical Thinking Framework defines the course of action needed to develop CT:

Critical thinking is the intellectually disciplined process of actively and skilfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action. In its exemplary form, it is based on universal intellectual values that transcend subject matter divisions: clarity, accuracy, precision, consistency, relevance, sound evidence, good reasons, depth, breadth, and fairness.

- Intellectual Humility

This trait develops one's ability to perceive the known limitation and the circumstances that may cause biases and self-deceptively. it depends on recognizing that one claims what one's actually knows.

- Intellectual Courage

Courage represents developing a consciousness to address ideas fairly regardless its point of view or our negative emotions about it. Also, it helps us to develop our to a evaluate ideas regardless our presumptions and perceptions about it.

- **Intellectual Empathy** Empathy is related to develop the ability to put ourselves in the others' shoes in order to understand them. also, it develops how we can see the parts of reasoning of the others such as the viewpoints, assumptions, and ideas.

-**Intellectual Integrity** This part is related to develop the ability to integrate with others intellectual reasoning and avoid the confusion that comes from our own reasoning. Unlike the empathy, integrity focuses on the ability to others' reasoning for the topic and integrate with it.

-**Intellectual Perseverance** The perseverance develops the need to have the truth about the insight regardless the barriers that face against it such as difficulties, frustration, and obstacles. this helps us to build rational reasoning despite what is standing against it.

-Confidence in Reason

By applying the reasoning parts and encouraging people to come with their reasons, they start to build confidence in their reason and think in a rational way.

-Fair-mindedness

This trait develops the ability to start with a fair look at all the reasoning and traits all the viewpoints alike putting aside one's feelings, raises, and interests. The model looks tough but as a matter of fact it proposes a clear practical method for us to improve our thinking and also realistically evaluate our actions and reasons and improve both thinking and character,

2.5 Theory in Action

The common nominator between the theoretical approach in both the Revised Bloom's Taxonomy and Critical Thinking is the use of learning outcomes/ instructional objectives; in the scope of this work they have been considered to target the same learner expectations in reaching the intended skills, knowledge and competence at the end of the learning unit. Another factor which these methods share, is the inclusiveness of critical thinking in their structure. While Revised Bloom's Taxonomy rather sees critical thinking as part of affective strategies - or knowledge - Critical Thinking considers the same CT phenomena being the core feature running through the whole structure.

The competence-based learning processes are now the hype of the education theory and it is important to face the future: the educational theory has only one permanent feature in the present time - change. As an example, European Qualifications Framework, even though quite solid in its foundations, is by no means a finished product. The recent changes from spring 2017 redefine learning outcomes from KSC to 'knowledge', 'skills' and 'responsibility and autonomy' - eliminating 'competence' from the categories. While the change may at first appear to be a tiny detail it should be remembered that these three categories define the learning outcomes in any particular EQF decision. It is one of the changes we have witnessed and because EQF is an important structure within EU

countries, the political, economic and educational challenges within Europe cause pressure on the EQF structures as well. The original theory had discrepancies which could not be let unsolved. The present model of EQF helps compare national qualifications more transparently, more precisely and set the qualifications even closer than before.

One of the biggest challenges in this work has been the opaqueness between various interconnecting levels and hierarchies describing critical thinking. There is a parallel to the joke where blindfolded people are to describe an elephant by touching either its tusks, ears, trunk or tail. Here, it has not only been the difficulty of gathering the details to form a picture of an elephant – there has been a whole herd to get acquainted with. Critical thinking has become a fashionable term which is used in a plethora of contexts and definitions. For example, CT is at times defined in a very narrow fashion (for example within some of the following examples on the changing idea of learning models) but likewise there is the whole field of study in Critical Thinking in which education is but one aspect of the whole idea of forming an objective mind in search of clarity and independence of thought.

The educational theory base itself remains in state of flux which makes it evasive to the learner but also extremely interesting to study because of gaining the feeling of understanding the mechanism – or at least some of it. Critical Thinking is the core theory in this work and furthermore, its approach grounded on the philosophy-based line of study at large is where it focuses.

At one level, there is modern educational theory, or EQF as its European representative it in this work, and its dependence on Revised Bloom's Taxonomy and at another, the possibility of syllabus and course design combining features of both Bloom and Critical Thinking. Ultimately, the applications of theory have one end in the multinational policy strategies - for example within the EU educational framework - and another end in the grassroot possibilities of lesson/ course/unit/ module design for any teacher.

The following Figure 12 collects together the concepts and targets in this paper. The trinity of Critical Thinking, Revised Bloom's Taxonomy and European Qualifications Framework are the core subjects within this work and have been discussed throughout this work. At this part some practical features drawn from the material or ideas of the combination of these three methods will be presented shortly. Personally, I have realised the power of visual information during the last few years; maybe it's part of my learning process. Here is my work in short (Figure 12):

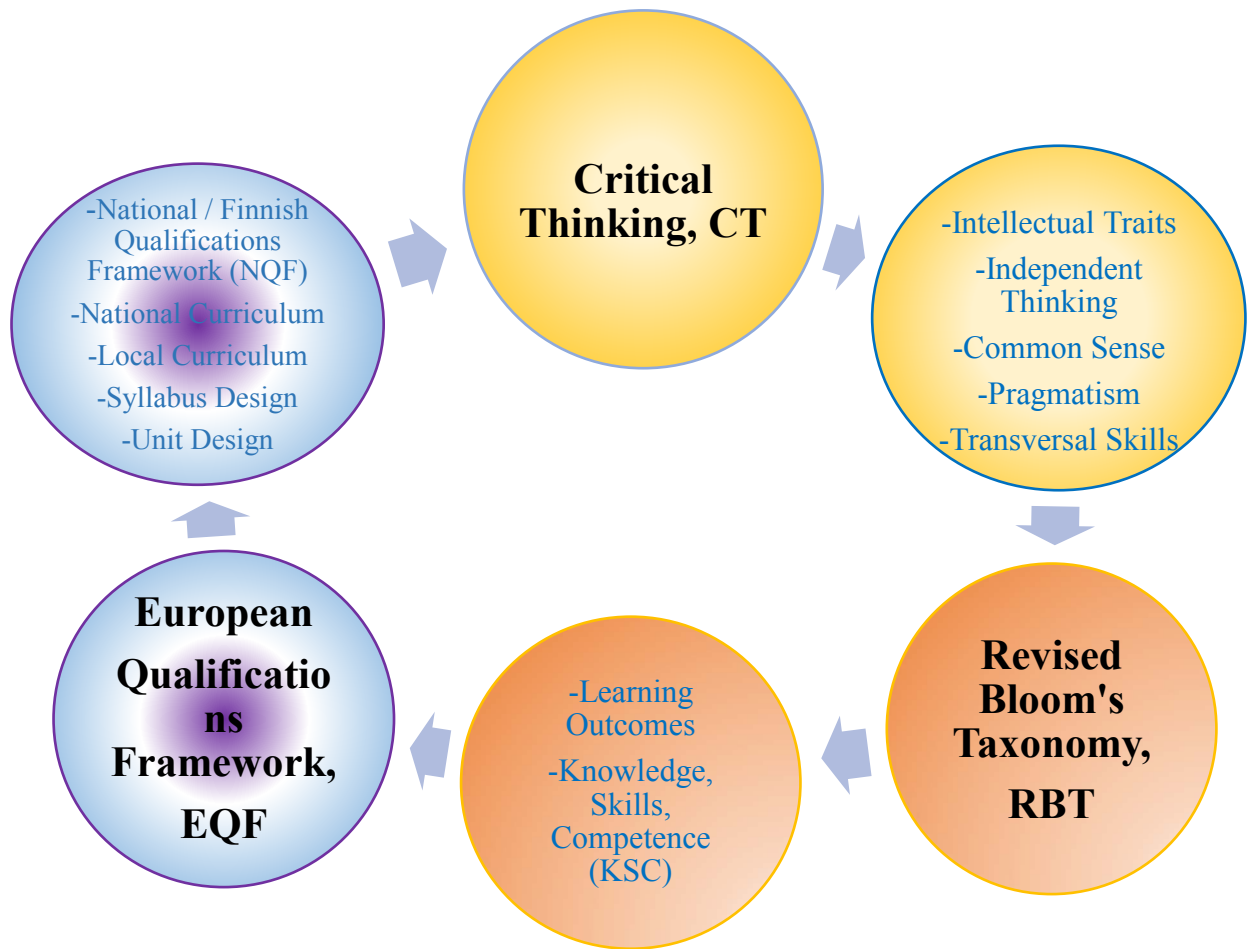


Figure 12 The Core Concepts in 'Learning Outcomes: Revised Bloom's Taxonomy and Critical Thinking in Two Examples of Unit Design'

The Real Revised Bloom's Taxonomy

Knowledge Dimension	Cognitive Process Dimension					
	Remember	Understand	Apply	Analyze	Evaluate	Create
Factual Knowledge						
Conceptual Knowledge						
Procedural Knowledge						
Metacognitive Knowledge						

Figure 13 The Real Revised Bloom's Taxonomy (Anderson, Kratwohl: 2001)

Example 1: This table follows the idea of Figure 7 which shows a pyramid presentation of the increasingly demanding levels in learning outcomes. This table is a practical tool for checking either planned or fulfilled learning outcomes. All affective levels (knowledge dimension) should be included in a well-rounded learning unit. If the learning unit appears to have all the learning outcomes in 'Factual Knowledge', the unit wouldn't really have the learner but certain kind of information in focus. The cognitive processes, on the other hand depend on the targeted level of acquisition. What it means, is that if the learners just started studying the subject matter, they should rather have targets on 'remember' or 'understand' while let's say a doctor specializing on surgery should be at the stage of the education where the highest levels 'Analyze', Evaluate' and 'Create' were the main cognitive categories.

Example 2: Critical Thinking as in this work by the Paul-Elder Critical Thinking Framework does sound at times like a new-age yoga course prep-talk. Just like yoga is god for you, so does CT appear to be. Similar ideas as those within the critical thinking can be studied in many countries and RBT categories are being used often as a method for teaching children to verbalise their learning process. In a lot of syllabus design the core ideas of critical thinking permeate the ideology but critical thinking is mentioned only as narrow section often in negotiating the truth value of information on the Internet or some other similar function. One of the fashionably impossible expressions is 'transversal competencies'. The following Figure 14 lists in all the expressions that the educational fashion dresses up in the 2010s. One of the key qualities is not-so-surprisingly 'Critical & Innovative Thinking'. The contrast in this kind of methodology to CT (as in this work) is that listing the skills doesn't mean they are being acquired; who has actually gained the needed education to pass on the knowledge how to actively learn these skills which need for example clear amount of affective skills from the learner. Transversal competencies sounds like a very extensive set of qualities needed in the 21st century. There actually exists a model called 21st century skills and it resembles transversal competencies in many aspects. Critical Thinking advocates an approach where it is assumed that in order to learn critical thinking one has to be taught how to learn to think critically. Once you learn a little, you understand that critical thinking is a process which will never be completely mastered, if one follows the principles of intellectual traits; 'intellectual humility'.

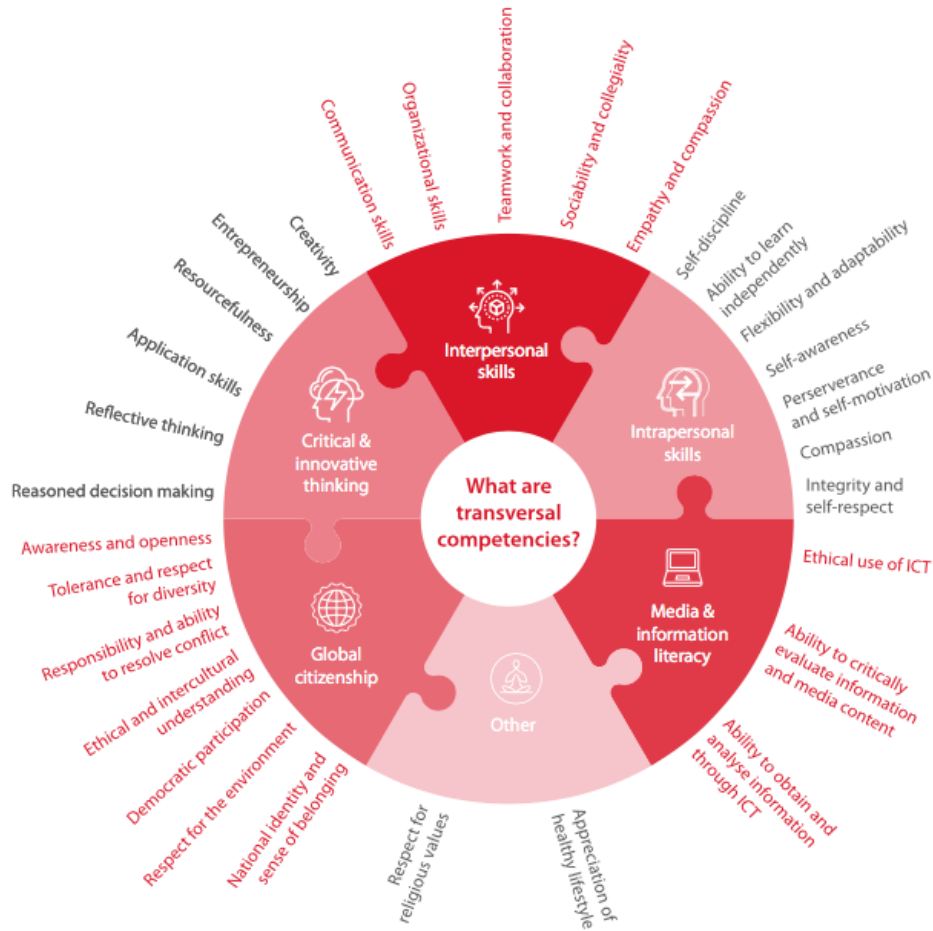


Figure 14: Transversal Competencies

Example 3: Transversal Competencies in the Finnish Curricula. The last example includes a version of a similar approach as the previous figure. The Finnish Curricula includes 'multidisciplinary learning modules' which are part of the new curricula. Critical thinking does not appear in any category but the CT spirit in the model is clear.

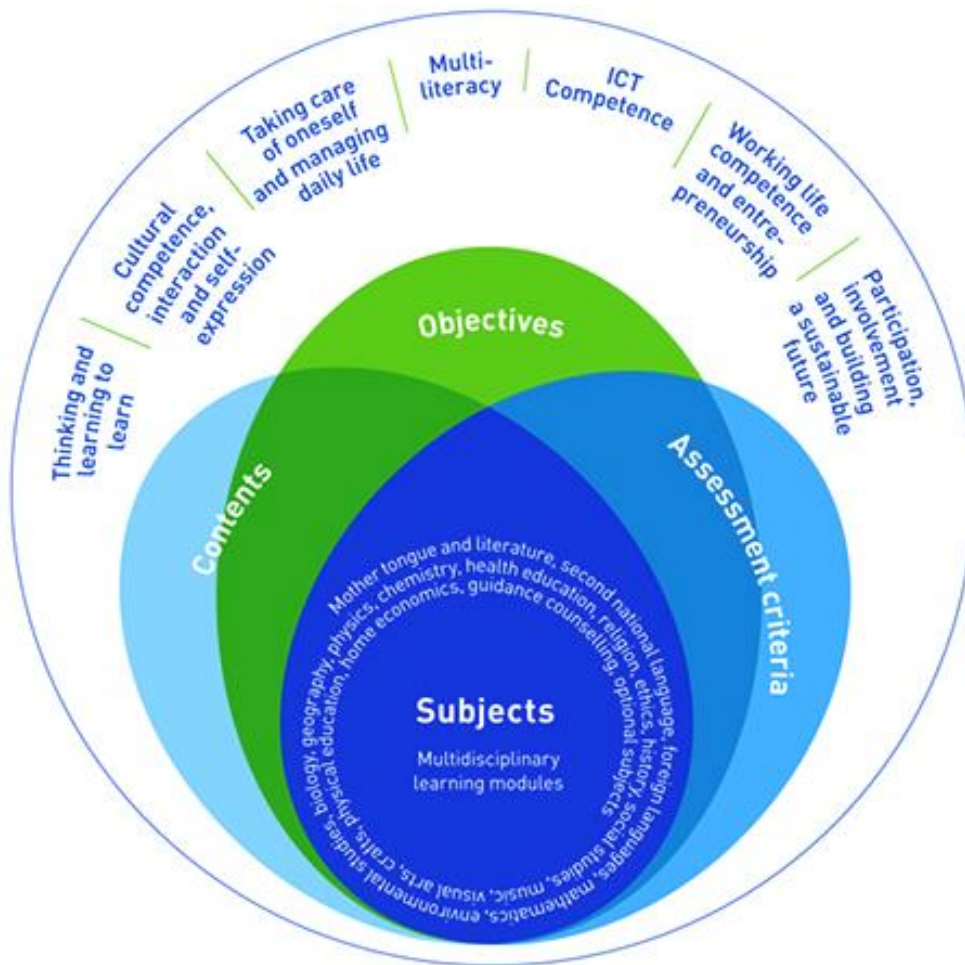


Figure 15: Finnish Curricula- Multidisciplinary learning modules

3. Research Approach

In many ways the approach in this study has been influenced by the Paul-Elder Critical Thinking Framework (2001) and the concepts of Elements of Thought, Intellectual Standards and Intellectual Traits. Considering the **Elements of Thought**:

- The **purpose** of this paper is to share knowledge I have learned from my two experiences in unit design.
- The **question at issue** is to make someone else curious about CT, EQF and course design.
- I have wanted to learn and share **Information** on the theory influencing the EQF and show learning units can be designed.
- My **Interpretation (and Inference)** is that the subject and material of my study relate directly to my work and are important for my professional skills.
- **Concepts** in this work are relevant - they aim at opening up the theory our curricula is based on and knowing what the concept are based on, it will be easier to understand the structures and goals in the modern curricula.
- **Assumptions** connected to my paper are that in ten years educational theory will have a different direction than at the moment, CT values will be better known and the idea of studying CT will be getting popular.
- **Implications and Consequences** I expect the learning outcome approach will be part of educational design and for example peer assessment and other means for evaluation will develop.
- **Point of view** Have I managed to make my account on CT and RBT interesting enough for the reader? After getting acquainted with the CT concepts, particularly intellectual traits, introduced this master's thesis, the reader will compare his/ her manner of using similar ideas at present time.

My research approach has been influenced by Action theory. When I got started with my thesis I was striving for an objective manner of writing but throughout the process it has become clear that my paper is rather a learning portfolio. The theory included in the work is an actual work package for writing learning outcomes (or instructional objectives), the appendices will guide the writing process and the following two examples show what the finished products can look like.

At the same time, I would argue that the experiences I have interpreted based on the ideas from the Critical Thinking course, have made me more aware of the whole process of learning, teaching, assessing and evaluation, considering the syllabus and its targets and the whole network our education is part of. All of the things in the previous sentence fit well in the idea of action theory which take the writer's personal account in as the base for the study itself.

The results of the two course plans offer two approaches for creating and applying theory into course design with the learner and the learning objectives in the centre.

4. Results

Lesson #1: Critical Thinking is Hard. The upshot for teaching critical thinking is that we should not look for magic bullets. No fancy new technology or teaching technique is going to produce dramatic transformations without the necessary time and effort being applied. Critical thinking is more of a lifelong journey than something picked up in a two-week module. However, just because mastery takes such a long time, it is never too early - or too late - to start working on it.

-- Tim van Gelder in Teaching Critical Thinking: Some Lessons from Cognitive Science

If this paper has been able to reach any of its goals the reader should – if not agree – at least understand that even if redesigning instruction is a challenge for teachers, there are not many realistic alternatives to face the modern paradigm in teaching and learning. As pointed out earlier the role of the learner has shifted from one receiving information passively into being an active agent in the learning process. Learning outcomes – writing them, using them – represent a target and mode of thinking where without exception the learner creates the centre and the core questions to answer are what and how he/she is expected to remember, understand, apply, analyse, evaluate and create.

What does this altered reality mean for teaching professionals and how are they, we, equipped to develop education to answer the challenges it causes? The top levels – for example international policies into which the national educational strategies are often tied into by politically influenced measures – are part of our local curricula as well since the learner and learning defined education is part of any teacher's reality. Learning outcomes are still something new but without doubt a part that will be in the centre of attention in the following years.

This is the hands-and-arms-in-the-dirt part: Two different projects of unit planning and writing and revision will be described depending on the timeframe - i.e. what they were about, who were involved in these processes and how were the actual course models and possible instructions and evaluations established.

The first course design is leaning on the European Qualifications Framework (EQF) which in part is largely influenced by Revised Bloom's Taxonomy (RBT) or Anderson and Krathwohl 2001 as it is often referred to in Finland. The course design itself was created for international student exchange in floristry. Even though this project took place later, it will be presented here first. The reason for this, not to underestimate the reader, is the clearer structure and design. Hopefully this will also make it easier to appreciate the nature of the other design since the target in the learning outcomes follows different methods.

The second model for course design follows the instructional objectives in contrast to learning objectives approach. While this work chooses not to make the difference between these two

approaches more than a ripple, it needs to be acknowledged - maybe rather as a possibility than anything else. Here CT refers to the whole field of study - not as competence or a category in learning process as is often considered in many frameworks.

The approaches on the accounts of both the course designs have been influenced by the writer's own experience with the material. The revision of standpoint to learning, teaching and evaluation has given possibilities for professional growth and a rewarding opportunity for re-evaluating the purposes and goals of practices at work in the actual classroom. While the writer is but a beginner in applying the theoretical framework discussed in this work to teaching, the fact remains that these big ideas have become an interest or possibly a passion for acquiring more knowledge, experience and collaboration in the future.

4.1. Unit Design by EQF - A Learning Unit in Floristry

The practical part of this paper first describes a case where Revised Bloom's Taxonomy was actively applied to an EQF based project. The European Qualifications Framework was both the guideline and the target in forming modules for student exchange in this ERASMUS+ KEY ACTION 2 project – Strategic Partnership “*Towards a common and transparent European learning and working framework through ECVET and EQAVET*”. (ECVET= European Credit System for Vocational Training and Education, EQAVET = European Quality Assurance Reference Framework for VET). To understand what the project actually means it is important to describe concisely the intention and goal behind the structure of the whole project. In short, ECVET has two main targets: to support mobility of European citizens and to facilitate lifelong learning. These two are also part of the major targets of EQF.

Figure 11 below gives a clear and concise account on ECVET. The nine different technical components form the shared framework in which the target is transparency of qualifications and similarity of standards in both accumulation and transfer processes within EU. Shared values for approaches in forming and evaluating learning outcomes and setting the corresponding standards for qualifications objectives throughout the national frameworks in EU are founded on the uniform targets of both transnational mobility and lifelong learning for all EU citizens. More on ECVET at <http://www.cedefop.europa.eu/hr/news-and-press/news/using-ecvet-geographical-mobility-2012>

The floristry project participants were nine vocational education and training colleges and an industry organization with a purpose of a goal oriented strategic partnership project where the partners would have access for deployment, legitimacy, dissemination and sustainability of project results as well within as outside of the FLORNET Transnational Network for Professional Education.

The activities were not only planned to be pilots but also take place after the end of the project. The main goal of the project was to provide practical and realistic course material which would be relevant throughout the various levels of EQF - all the way from European multinational level to national, regional and organizational use.

Figure 1 | ECVET objectives and its technical components

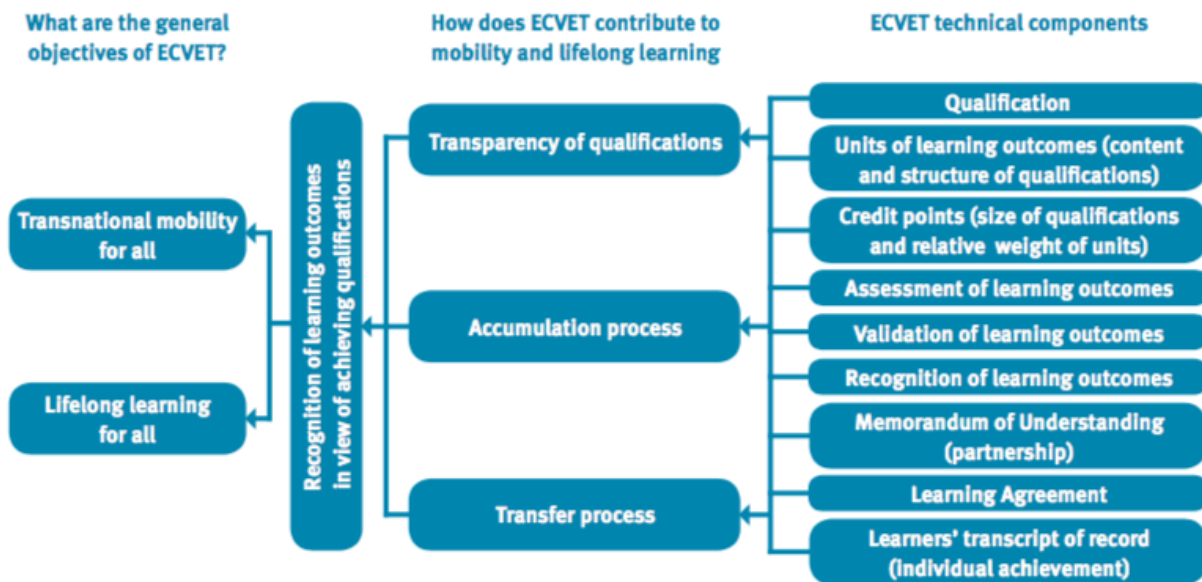


Figure 11 ECVET objectives and its technical components

Other targets included increasing project member institutions' cooperation and lifting education in floristry to a higher and more sustainable level. The participating students had an opportunity for taking part in these international learning units formed around floristry with both subject specific knowledge as well as a meaningful international experience.

More on the project in detail can be found at <https://www.blumenkunst-weihenstephan.de/internationale-aktivitaeten/erasmus-key-action-2-project-strategic-partnership.html> and on an internet presentation (Prezi) I created for Keuda part of the project presentation <https://prezi.com/3sphfpwf97vx/erasmus/?webgl=0>.

For my part the story started a couple of years after I had initially got acquainted with the concepts of Critical Thinking and Revised Bloom's Taxonomy through an online course at the University of Oregon (in detail in the following part). That time I had been working for a couple of years at a vocational college when a development through work brought me back to my CT materials.

The Floristry section in Keuda, Keski-Uudenmaan koulutuskuntayhtymä, had started an Erasmus+ Key Action 2 project – Strategic Partnership “Towards a common and transparent

European learning and working framework through ECVET and EQAVET” together with eight other vocational colleges and other stakeholders. At the time I got drawn into the project the college representative in Keuda's floristry section was about to take part in the project meeting where the first drafts were to be discussed. I got the opportunity to join in for the translation process of the units the college was to prepare.

Our task at the beginning was to set the first draft of learning outcomes and targets for two modules; 'Customer Service and Maintenance Work in a Flower Shop' and 'Floral Design'. Within the time scope in May 2015 we had time barely for crafting the first unit - that was when the actual workload dawned on us. Since the scope of this paper is limited and both the planned courses follow similar stages in form, only the unit in customer service will be given a detailed account of in this paper.

The project started us creating a basic list of tasks, duties and activities the work in a flower shop would entail. As a reference unit we followed 'Serving customers and shop work in floristry and horticultural business' by the Finnish Vocational Qualification in Horticulture 2010, Specialisation in Floristry and Horticultural Business even though we weren't able to lean on its structure as much as we had hoped for. We had to keep in consideration the correct EQF level which was three (which refers in this context to the level of studies during secondary education, more particularly the second year of vocational education), it was generally expected that the students would be somewhat limited in their language skills and this would need to be considered in the manner of writing the (https://www.oph.fi/download/140421_vocational_qualification_in_horticulture_2010.pdf)

One of the other major differences between the studies described in the Finnish curricula and the unit for the project were length and scope. The student exchange in the project was planned to take a month consisting of a two-week school-based tuition part and the rest on-the-job learning in a flower shop. The otherwise corresponding vocational entity in the Finnish curricula consisted of studies and practice of 16 weeks within a timespan of one year of studies. So, one of the major decisions was deciding the focus and scope of the target unit keeping the time frame in mind.

After the first take on the design in May 2015, the bulk of writing and revision took place during the following study year 2015-2016 in several workshops mainly in Saari Manor, Mäntsälä (Keuda Floristry Unit) and as project work in between meetings. During this time our local team was strengthened by an extremely qualified and experienced florist from Keuda floristry. The three of us went through several stages in creating the learning units, planning and organising the pilots/exchanges etc.

Presented in this paper is the finished unit "Customer Service and Sales: Flower Shop Work and Maintenance" for which was written at the end of May 2015 while the second copy is the final

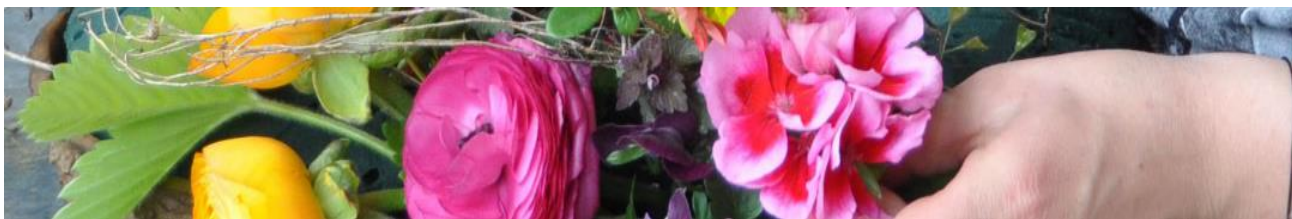
unit design on the same unit and finalised approximately a year later in May 2016. One of the big changes during the writing process was the change in the order learning outcomes were listed. The original Knowledge, Skill, Competence order changed by moving Competence as the first category. This cosmetic change at the same time as forming Key Activities and Learning Outcomes proved out to be much more demanding than we had expected. Reflecting the project, one of the aspects which made the project double demanding for me, was the subject matter itself. The rest of the project participants were professionals either in floristry or horticulture; my experience was limited to two years of teaching English to students in horticulture.

When my share with the project started, there was no measure to my initial surprise and excitement realising the methodology used in forming the modules was in many parts already familiar. I dug up the CT course material and there were tables and ideas that proved out to be extremely helpful. Getting involved in the process of creating course material was very interesting, demanding - and frustrating at times – but at the same time satisfying seeing theory turning into practise. The international student exchange units in Keuda, Saari Floristry Unit became reality already during the same winter in the shape of running the pilots of the designed study units for the planned amount of exchange students. By the end of the Erasmus + project it appears to have been a success.

4.2. A Learning Unit by the European Qualifications Framework

After not seeing the unit for a couple of years I would be more precise with:

- a) Choice of RBT action verbs (Appendix 1) and compare them to categories in Cognitive processes (Appendix 3),
- b) Argue with the team about use of ABCD model (Appendix 2)
- c) The notes made to comment on the unit will be written in blue.
- d) For this kind of unit structure it would be of benefit to use Appendix 1 -Appendix 4 in writing them and agree at the beginning with all participants on the same standards.
- e) Customer service would have needed to be included more in the unit.
- f) Skills in Measures are clear and good amount for the length of exchange.
- g) The unit doesn't look as hard to create as it was.
- h) What we found particularly challenging was sorting out the learning outcomes to correct categories.
- i) Skills in Assessment follow RBT and appear quite ok



Learning Units for students in an international setting for floristry
 The European Platform in Floristry and Vocational Education and Training (EFPVET) drafted these units. ([document in English uk](#))

TITLE:

Level:

Context Descriptions	
Reference to the qualification	Floristry
Assessment Protocol Requirements	Assessment takes place in an authentic situation/ Assessment will be made by certified assessors from the branch and education
EQF Descriptor Level	3 The learning unit was planned for students during vocational studies

Level 3 The learning outcomes relevant to Level 3 are	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems
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The following micro units can be used within cross-border mobility program within Floristry to ensure the compliance with ECVET principles. According to the duration of the work placement one or more micro units can be chosen.

Title of the Learning Unit	Customer Service and Sales: Flower Shop Work and Maintenance
Sub Units	<ul style="list-style-type: none"> • basic flower shop work and customer service • displays in different settings eg. flower shop, occasions and fairs • flower shop marketing in business setting and on internet • customer advice in a garden center <p>Possible unit designs at the same level but not written at this point</p>
EQF	3 Info about level above
Learning Outcome	<ul style="list-style-type: none"> • Daily maintenance work in a flower shop according to instructions

<p>-where is the customer service?(how to doesn't cover the matter) -maybe contrasting cultural differences in maintenance work and floral arrangements</p>	<ul style="list-style-type: none"> • How to make, maintain and change displays according to instructions • How to make basic floral arrangements and bouquets according to instructions • How to communicate effectively and politely with customers and within work community • How to use sustainable materials and working methods • Follow health and safety procedures in work environment <p>'According to instructions' probably refers to DEGREE (in ABCD table- maybe 'as demonstrated at the beginning of the learning unit'. These students have some experience already</p>
<p>Key Activities</p>	<ul style="list-style-type: none"> • Apply general principles and practices in flower shop work in given settings CUSTOMER SERVICE ? • Make use of vocationally-specific regulations concerning environmental issues and sustainability <p>Contasting differences in floristry in the countries in question</p>

Maximum level III 'Applying' in RBT action verbs (EQF 3)!

Competence	Knowledge	Skills
<p>S/he...</p> <ul style="list-style-type: none"> • Performs daily maintenance work self-reliantly and responsibly in flower shop setting <p>Selects, matches, demonstrate, show</p> <ul style="list-style-type: none"> • Makes basic floral arrangements independently following instructions constructs • Communicates effectively with customers and colleagues Reliably, correctly, logically • Works self-reliantly in given settings independently <p>S/he is responsible for...</p> <ul style="list-style-type: none"> • Performing health and safety procedures in the work environment • Working in a qualified and effective manner 	<p>S/he knows...</p> <ul style="list-style-type: none"> • knows the principles of interacting and co-operating within a working environment/community • has knowledge of cut flowers and plants and their biology <p>S/he is familiar with...</p> <ul style="list-style-type: none"> • flower shop policies in different/varying countries • assessing her/his own work and receiving constructive feedback 	<p>S/he...</p> <ul style="list-style-type: none"> • takes care of daily flower shop routines • shows knowledge of plant biology in work • constructs standard floral arrangements • helps customers and serves them adequately • uses appropriate sustainable methods and products

<ul style="list-style-type: none"> to adapt to varying situations 		
--	--	--

- the verbs match RBT verbs, only 'Construct', possible options added in yellow

ASSESSMENT: PRESENTATIONS	
DURATION: 4 weeks	
Student	Name: _____ Date _____ of birth: _____
Placement:	Name: _____ Country: _____

	Measures	Skills On EQF level 3 he/she can...	Passed		Not yet	Not applicable
			Excellent	Good		
1	Daily maintenance work according to instructions RBT verbs in skills VERY GOOD !!!	Carry out preparation work				
		Maintain displays				
		Keep the shop tidy, clean and orderly				
		Use and maintain vocationally-specific machines, tools and materials				
		Recycle waste by local guidelines				
		Show and list daily tasks in order of importance				
		Demonstrate knowledge of plant biology in handling of plants				
		Identify the plants in the shop by scientific names				
		Tend flowers and plants in the shop				

	Measures	Skills On EQF level 3 he/she can...
2	Basic skills in arranging flowers and appropriate packing	<p>make basic bouquets, arrangements and planted design according to instruction</p> <p>pack basic flower designs accordingly eg. local weather conditions</p> <p>FINE!</p>

	Measures	Skills On EQF level 3 he/she can...
3	Communication with customers and in work community	<p>meet and greet the customer</p> <p>express her/himself clearly by using relevant vocabulary in floristry</p> <p>list steps in customer service</p> <p>show social and communication skills with colleagues</p>

	Measures	Skills On EQF level 3 he/she can...
4	Health and safety regulations, sustainable materials and working methods	<p>comply with local health regulations</p> <p>act in accordance with safety regulations</p> <p>sort and recycle waste</p>

		use sustainable working methods

Signature

Placement supervisor

Teacher

Independent assessor
representing the national
branch

Stamp, Work Placement

4.3. Unit design by CT -An Example Of Course Design

The other unit design is the first one timewise from spring 2013. Personally, the reason to choose to show this design last was to hold on to the reader as long as possible - this is heavier in structure but for me the first project work of this kind. So, having the lighter unit first you got this far! This is the unit which was created on midnight oil - simultaneously with the CT project (created with a partner in Slovakia, trouble with the Internet) we were moving into an almost finished house while I was struggling with the end-of-the-year evaluations at work. The Unit is a bit heavy and if I were to write it now, in retrospect, I would think more of the students and what they might enjoy without missing the instructional objectives.

This Course design comes close to the learning unit in Floristry for two reasons. The first, obvious, pragmatic reason is that both of them represent a model formed for a study entity. The second one, possibly not as important on the surface but for me, working in a team for this kind of target has been something I have come to appreciate immensely. Most of the time teachers work surrounded by people - alone. The possibility of getting feedback, to share ideas, disagree and unite different approaches and come up with something more you could have done on your own has been, on top of being a lot of heavy work, very satisfying. The project details get forgotten, the people I was working with won't.

4.3.1. Project Description

In spring 2013 I took part on 'Critical Thinking in Language Learning and Teaching' course which was applied through and made possible by a tuition scholarship from the U.S. Department of State as part of the Teacher Scholarship Program and offered through the University of Oregon, Linguistics Department, American English Institute (UO AEI). The course consisted of a ten-week online teacher training course with an intensive content of weekly readings, single, pair and group exercises, analysis and assessment and continuous online commenting on weekly discussion threads. There were participants, all connected to teaching, from all over the world, altogether around 25 at the start. All exercises, tasks and participation on discussion were evaluated both on weekly basis as well as at certain parts of the course when particular study entities had been finished. The course took place from April 1 – June 7, 2013 and in terms of scope the course was ten (10) Continuing Education Units (CEUs) or 100 hours of instruction which is equivalent to 20 ECTS credits. The main course topics and learning objectives included:

- Understand and explain critical thinking concepts and patterns.
- Identify relevant resources for developing and using critical thinking.
- Identify and analyse teaching techniques and materials to incorporate critical thinking in teaching and learning.
- Apply critical thinking to classroom teaching and materials development: redesign and implement instructional units and lesson plans with activities that require critical thinking.
- Plan a course of action to systematically develop thinking in personal and professional life.

Personally, there was no prior knowledge of the topic of the course, Critical Thinking as a field of study within education but I was keen on the ideas of language learning and teaching. The course started with us, the participants defining what we saw as critical thinking and then followed up with an introduction to what CT actually meant as a field of study. The particular framework the course followed the principles of the Paul - Felder Framework (2001). More information on the framework can be found on The Foundation of Critical Thinking Internet site <http://www.criticalthinking.org>. The foundation describes itself on the site as 'a non-profit organization that seeks to promote essential change in education and society through the cultivation of fairminded critical thinking--thinking which embodies intellectual empathy, intellectual humility, intellectual perseverance, intellectual integrity and intellectual responsibility'.

In the CT course I took part at the university of Oregon consisted of weekly tasks on the corresponding reading materials, individual exercises connected to learning to use the CT framework

and course participants were working simultaneously in pairs or small groups with exercises which were taking longer - the one with lesson and unit design was longest took several weeks. The pairs started with creating a lesson plan together, had it peer assessed, made necessary changes and the final revised version was evaluated by the course leader. Similar method was used for the unit design - the peer assessment was conducted by the same pair as the lesson plan, and likewise we had analysed their lesson plan and course plan. The final version with the feedback and evaluation by the course leader came out in week eight of the project while we had started with the plan on week five. All our coursework was evaluated by the course leader and after the course finished we got the course results by mail.

4.3.2. A Course Design by Critical Thinking

The unit plan starts with an overview of the whole course. The lesson plan constructed earlier is mentioned here. This is the very heavy part where we have tried to use the whole repertoire of possible exercises and activities. The blue corrections all through the text are by the project leader evaluation.

Unit Plan: Focus on Critical Thinking

I. Unit Overview: Please write a short overview of the unit giving some specifics, such as title and length (use your creative thinking!) as well as more general information that provides context for the lesson that was redesigned in weeks 5 & 6. In the sample overview, terms related to CT are in bold to help you keep in mind that it is the CT in this unit that should be highlighted.

The unit is titled "Literature-based Essay Writing" and includes six 90-minute lessons. The sample lesson "Text Analysis", which was designed in weeks 5 and 6, comes in the middle of the unit. The unit begins by introducing the general outlines for the **course unit** (including the concept of reading literacy) and then during the unit students will go through the included authors and write essays based on the course literature. Students will approach the materials from several different viewpoints and discuss the themes of novels and short stories in relation to their private experiences, the present state of the world and the environment. This way allows them to discuss different perspectives of the given sources and of the issues that they will be writing about and offers them practice in identifying main and side themes and ideas and restating them in their own words. Students will write essay paragraphs of varying lengths at every double-lesson and at the end of the unit they will produce a longer essay focusing either on one of the literary works and arguing some of its major themes or they will choose a theme shared in at least two of the novels and short stories and will analyse it from a new angle based on the analogy with their life experiences.

At the beginning of the **course unit** the students are introduced different ways of writing essays (e.g. definition essay, classification essay, description essay, sequence essay, evaluation essay, explanation essay) and they learn to distinguish them to be able to use the appropriate one for a chosen theme from a literary work. The first lessons thus cover reliability of sources and accuracy and relevance of information.

At this stage of the unit the cascade method is used when a teacher becomes a facilitator, an observer and a professional adviser and students study and learn quite large learning material on their own. After the teacher's short and very brief presentation of several types of essay students choose three or four types that fit the aim best, explain their choice and justify their statements. The class is divided into three groups, each group of 4 people. Each group studies characteristics of one type of essay (if they need to study more types than the number of groups is, one or two groups can study not one, but two types of essays and take it as one whole). Then two of the students from each group go to other two groups and teach their part about one or two types of essays there and the third member of a group remains in the original one – two other students will come and teach him their types of essays. Finally, in the original grouping students revise the newly-learned knowledge. With that knowledge students are able to construct a piece of writing based on the course literature. Subsequent lessons thus will cover appropriate usage of quotations, citation and bibliography writing. The assignments will be based on the specific style of the particular lesson or the style will be discussed and practised in other tasks during the lessons.

Students are expected to present their own views in a logical and factual manner. As varying group activities are an essential part of the unit, students are expected to improve their skills in argumentation and reasoning while giving space and showing respect for differing opinions.

The week three “**Text analysis**” lesson (based on the lesson plan from weeks 5 and 6) is presented as an example of classification (primarily as group work) and is started in groups where students gather themes (brainstorming) and later on reduce the amount negotiating together. They start writing short essays where they contrast the themes with their personal experiences. Along the way, the students continue to discuss the topics/themes.

During the course students are making a portfolio of all the materials they had used and all the written pieces they had created. At the very last double-lesson of the unit the students will be given opportunities for self and peer-assessment and reflection. They will be given a rubric to self-evaluate their **portfolio final product, which is the balanced and thoroughly argued essay, in retrospect**. The rubric will contain some supportive questions e.g.: Can I see any changes/progress in my own coursework? Have I been able to evaluate texts more analytically than before? Have I been able to use the newly learned techniques of essay writing in new contexts?

Then students will evaluate their partner group's final product. They will explain, support, justify or defend their statements, make judgments about the value of ideas in essays, select the most effective application or solution. Expressing their fairmindedness, they will also compare and contrast their approaches to the theme **of their final unit essay**. Through these exercises they will build their critical thinking in particular standards such as clarity, accuracy, logic, depth, and relevance. They will, thus, be better prepared to understand and react well to teacher's feedback and to give appropriate feedback in peer and self-assessment.

1. **Critical Thinking Unit Educational Objectives*** (these are **broad** statements that involve CT development; **no** “be able to,” which is instructional objectives language): Given the title and description of the unit, **please write 2-3** appropriate CT *educational objectives*:

1. Identify and argue major themes
2. Create different styles/types of essays
3. Evaluate your own and your partner group's **essays** unit work

III. Educational and Instructional Objectives—Cite any ideas from week 7 readings in Part III and Part IV.

<p>Corresponding CT Unit Educational Objectives (please use exact wording from section II, above)</p>	<p>CT Instructional Objectives (ABCD format) -- 2 instructional objectives per educational objective is sufficient – enough to illustrate your awareness of the difference between educational and instructional objectives and the concept of alignment between the two. Of course, your objectives from the lesson plan may appear here.</p>
<p>1. Identify and argue major themes</p> <p>Very clear method, no exceptions THE ABCD MODEL</p>	<p>Working in different group settings, students will be able to identify and differentiate between major and minor themes of a given text accurately within the lesson.</p> <p>Given a setting where the students are working in groups, students will be able to contrast their opinions with the others in an objective and logical manner during the entire unit.</p> <p>AUDIENCE, BEHAVIOUR, CONDITION, DEGREE</p>
<p>2. Create different styles/types of essays</p>	<p>Given the sufficient information about some types of essays and given a specific style of writing an essay Given unit specific styles of writing essays, student will be able to construct a piece of writing (based on the course literature) five out of six times.</p> <p>After the unit-specific essay styles have been practised, students will be able to create a balanced and thoroughly argued essay of their choice in 600 words.</p>
<p>3. Evaluate your own and your partner group's essays unit work</p>	<p>Given the rubric that align with the course unit outcomes supplemented with some supportive questions, students will be able to effectively and objectively evaluate their own progress in writing (portfolio) giving at least six examples of what they would change in their essays and their partner group's final product (which is the essay in 600 words defined and specified in the second instructional objective within the second educational objective).</p> <p>Given an opportunity for evaluating course productions, the student will compare different approaches with clarity and insight giving verbal feedback during the last lesson.</p>
<p>1. Description of CT Assessment Method/Technique & Alignment with Objectives: be sure to include criteria to be used, and briefly explain how you will ensure that students know these criteria. Describe how the assessment will be used either formatively or summatively. One assessment per educational objective is sufficient – enough to illustrate your understanding of an appropriate method of assessment and its alignment with the objective(s).</p>	
<p>1. Students will conduct a self-assessment in their original groupings (4 groups, 3 students in one group) and subsequently a peer-assessment in larger groups (2 groups, 6 students in one group). After being assessed, in a short panel discussion (frontal work) they will discuss if they are able to change their viewpoints after getting fresh ideas. They will use a rubric (summatively) that targets effective deep dialogue including delivery, use of evidence, questions, and logical argument structure. They will evaluate on how clearly their team members can explain complex ideas, how they react to opposing opinions and if they involve all team members into conversation using critical thinking standards of clarity, logic, and depth, which as explained in the overview of the unit will be standards that students will be working with repeatedly. At the end of the panel discussion students are supposed to come to an agreement on the three major themes with the others and the teacher.</p>	

3. Students will make a portfolio of all the material they have created during the course. At the end of the unit they are given a self-assessment rubric (formatively) for the evaluation of the final products that addresses, among other things, clarity, relevance, logic and depth of the thoughts and statements as well as students' fairmindedness in considering viewpoints other than their own in order to build better arguments. They will also be asked to specify the reasons for choosing the essays they wrote and which task they did not include into their portfolio (the third instructional objective).

THIS ONCE AGAIN IS HEAVY - STUDENTS WOULD NOT HAVE THE CONCENTRATION FOR READING IT!

*Refer back to the visual in the Discussion Board task prompt

Sample Assessments: Multiple choice, Constructed response (jigsaw, fill in the blank, and matching), Short Response (sentence to a paragraph), Extended response (essay or oral presentation), Process Performance (showing classmates how to do something, for ex. Self-reflection, Assessment Rubric

Unit/Critical Thinking Assessment Table

Instructor Assessment

Designers: Eva & Satu

Unit overview highlights the CT that students will be learning/practicing. It is clear, on-topic, succinct, and includes the lesson that was designed in weeks 5/6.	Excellent	Satisfactory	Poor
<i>The CT is clearly highlighted and is appropriate for the type of activities described. While there seems to be a lot planned, you have it mapped out in a logical and coherent fashion and have clarified the nature of the unit. I am not entirely clear on what a "double lesson" is, but maybe it is related to your perception of the 90-minute lesson. If I were to suggest anything here, it would be to abridge the overview.</i>	X		
There are 2-3 appropriate CT educational objectives.			
<i>Your EOs are well written and clearly include CT. All of the fit well with the description of the unit from the overview, and are worded broadly. If anything, I might suggest bringing in the the general type of theme(s) to be covered or mention the literary nature of the unit.</i>	X		
There are 2 CT instructional objectives per educational objective (the distinction between these is clear); they are written in the ABCD format with clear indication of degree.			
<i>Generally, these are all very well written in that they follow the ABCD format, clearly target CT, and include clear and measurable degrees. The first IO of the second EO is a little odd in terms of degree, in my view. They will do this 4 out of 6 times? Does that mean they won't do it the other times, or they will fail, or they will do it exceptionally well 4 out of 6 times? This could use some clarification. I also find that simply making a certain number complete the degree doesn't help measure CT per se. This is a fairly minor detail and for me doesn't detract from the overall high quality of the IOs.</i>	X		

<p>There is at least one summative or formative assessment method per educational objective. The method(s) is/are clearly explained and include(s) CT criteria to be used. It is also clear from the explanation how students will know these criteria.</p>			
<p><i>I admire that the assessments are orderly, realistic and follow the ideas from (are well aligned with) your objectives. The concern I have is related to how students understanding and awareness of CT standards and criteria for assessment will develop. This should be clearly detailed here.</i></p>		X	

Wk. 8 Task B: 9/10

This was a grand undertaking, which required a large dose of both creativity and criticality! You have done a fine job of creating a (hypothetical) unit, and demonstrated a good understanding of how CT can be woven into a bigger piece of the curriculum. Though this exercise had you make up a unit (which you may never teach), there are lessons to be taken away and applied to planning of your real instruction.

The biggest lesson is that CT cannot be an afterthought. It appears in the beginning stages of our planning (overview of a unit or set of lessons), it is explicit in our objectives, it is supported via instructional activities (as you saw in the lesson plan), and it is assessed in the end (and throughout) with appropriate instruments. To truly make a difference in students' thinking, it must pervade all teaching and learning activities.

Another lesson is that even though you are unlikely to take so much time to plan a unit (or lesson) and to such great detail in your everyday professional life, doing this exercise even once has hopefully helped to illuminate all the components that need attention and all the dots that need to be connected in order for instruction to be logical, consistent from beginning to end.

Finally, in collaborating with a colleague on this task, you have hopefully learned that there is not just one way of incorporating CT or looking at instructional/curriculum planning. There is no "right" way, and it is always a process. There are always areas that can be further clarified, elaborated on, and deepened. As our understanding of and experience with CT matures, so does our planning and of course our instruction. I hope my comments and questions encourage you to keep ruminating.

Our course leader gave us very positive feedback! After we had been writing and revising the unit with great intensity it felt really nice to have succeeded in a demanding task better than expected,

4.4. Final remarks

Critical thinking is a desire to seek, patience to doubt, fondness to meditate, slowness to assert, readiness to consider, carefulness to dispose and set in order; and hatred for every kind of imposture. ~ Francis Bacon (1605)

This paper has given an account of two different projects in which the created unit designs in many ways follow the state-of-art fundamentals of present learning theories in course design and the spirit of using instructional objectives /learning outcomes. Both are used to describe educational targets and goals and more important than the term itself is that the statement it carries along. The major differences between the theoretical applications is that (1) even though both set claims of critical thinking in their core, the Revised Bloom's Taxonomy doesn't include the variety and depth of forming and analysing the intended KSC (Knowledge, Skill, Competence) or the intensiveness of Learning Objectives compared to Critical Thinking (CT). The Elements of Truth and Intellectual Standards (and Intellectual Traits) as well as Instructional Strategies are methods the describe active thinking. To compare the approach from Revised Bloom's Taxonomy (and EQF as well) side, one has to admit this method being more user friendly and easier to take into use teachers and students. R M Harden (2002) who strongly suggests using the learning outcomes approach is able to stay objective and states:

It has to be recognized, however, that both terms— ‘instructional objectives’ and ‘learning outcomes’—are used to describe educational intentions or achievements and that what is more important than the term employed is what it is used to describe. What matters is that statements relating to the product of learn;

1. are user friendly and not too cumbersome and can be readily adopted by teachers and students and incorporated into their day-to-day practice and experience;
2. highlight the key broad learning outcomes and offer a flexible framework where individual institutional and national differences can be accommodated (in outcomes models with which teachers have engaged, for the most part, seven to 12 broad outcomes have been identified);
3. take account of the realities of medical practice where knowledge, skills and attitudes are integrated to make up competences (such an interaction is demonstrated in the three-circle model of learning outcomes— Harden *et al.*. 1999b);
4. identify what is achieved and assessed rather than what the intentions are (learning outcomes are a key component of blueprints or grids for assessment);
5. engage the individual teacher and student and give them some measure of ownership of the process.

The approaches on the accounts of both the course designs are influenced by the writer's own experience with the materials. The change in standpoint to learning, teaching and evaluation has

been a welcome possibility for personal growth/ development and a rewarding opportunity for re-evaluating the purposes and goals of practices at work in the actual classroom. While the writer is but a beginner in applying the theoretical framework discussed in this work to teaching, the fact remains that these big ideas have become an interest or a passion for acquiring more knowledge, experience and collaboration in the future.

5. Conclusion

In my paper I have wanted to share the learning process I have gone through in getting acquainted with learning, teaching and educational theoretical frameworks in both Critical Thinking and Revised Bloom's Taxonomy.

The theory in this work concentrates in learning outcomes which are determined as statements of what a learner knows, understands and is able to do at completion of a learning process. Learning outcomes reflect the present educational paradigm in which the learner and the learning process are in the centre of activity. The progress in learning and the learning process are described in terms of knowledge, skills and competence. These aspects reflect the cognitive and affective dimensions and the resulting level of competence.

In larger context, the combination of knowledge, skills and competence and the resulting learning outcomes shape the core of the European Qualifications Framework for Lifelong Learning (EQF) which strives for transparency of educational goals and qualifications all over Europe.

The structures of EQF include the ideology of Critical Thinking but not as an overt realisation in the way Revised Bloom's taxonomy does. The Paul-Elder Critical Thinking Framework, the chosen method from the variety of the same field, has its application in unit design as well. The unit design gives a very detailed take on the underlying processes and analyses the resulting outcomes in depth. In a similar stand, the influence of critical thinking, as the Paul-Elder framework, is deep in the inner structures of European Qualifications Framework. While 'critical thinking' can be referred to within the framework, this usually means the way we are aware of the influence of false information. The actual Critical Thinking can be referred to as Transversal Competences/ Competencies which for the most include the majority of Critical Thinking features.

At the end of this work process my personal conclusion is that the model for forming learning outcomes or rather learning units in Revised Bloom's Taxonomy gives a clearer standard which is also more user friendly. Nevertheless, creating a learning unit is hard work. Defining the correct levels and using the correct expressions can be learned and the followed more easily afterwards. What remains hard every time is the content and forming the learning outcomes - especially in a manner where the process focuses on the learner and the educational targets.

I have gained in Revised Bloom's Taxonomy a practical tool for work. I know for certain this paper isn't the last time for Bloom and me to meet - the present curriculum and taking it into active use will benefit from the structures I have learned to use. In a similar fashion The European Qualifications Framework and the way it will develop in the future will also be of interest because of its influence on national curricula and education at local level.

Critical Thinking is an integral part of this work. Elements of truth, for instance, how we learn to learn, the manner in which an individual considers him/herself in relation to other people and the surroundings and to what level he/she is willing and capable to question these 'truths' throughout his/her lives are the questions we carry with us to find answers along the route. For me, Critical Thinking has given me a skill of approaching problems from several viewpoints and being more aware of 'Elements of Thought'. My assumption is that the method in Critical Thinking supports the kind of values which will part of common behaviour in the coming years.

The points of interest in my work have been barely touched within the scope of this paper. Any of the features could be easily studied in detail for the benefit of present educational reforms. The Revised Bloom's Taxonomy, as an example, could be used as a standard for local curriculum design or at least in projects or unit design.

Coming back to the process this work has been, there have been times when it has been impossible to believe the final words will eventually be at hand. I have worked a lot and studied a lot for this paper but what has ultimately made this paper worth writing and getting it finished, is the people I have come to have known and worked with during this time and the support and love from my friends and family.

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- <https://www.criticalthinking.org/ctmodel/logic-model1.htm>

Appendices

Appendix 1: Revised Bloom's Taxonomy Action Verbs (Anderson & Krathwohl, 2001)

Definitions	I. Remembering	II. Understanding	III. Applying	IV. Analyzing	V. Evaluating	VI. Creating
Bloom's Definition	Exhibit memory of previously learned material by recalling facts, terms, basic concepts, and answers.	Demonstrate understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas.	Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way.	Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations.	Present and defend opinions by making judgments about information, validity of ideas, or quality of work based on a set of criteria.	Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions.
Verbs	Choose Define Find How Label List Match Name Omit Recall Relate Select Show Spell Tell What When Where Which Who Why	Classify Compare Contrast Demonstrate Explain Extend Illustrate Infer Interpret Outline Relate Rephrase Show Summarize Translate	Apply Build Choose Construct Develop Experiment with Identify Interview Make use of Model Organize Plan Select Solve Utilize	Analyze Assume Categorize Classify Compare Conclusion Contrast Discover Dissect Distinguish Divide Examine Function Inference Inspect List Motive Relationships Simplify Survey Take part in Test for Theme	Agree Appraise Assess Award Choose Compare Conclude Criteria Criticize Decide Deduct Defend Determine Disprove Estimate Evaluate Explain Importance Influence Interpret Judge Justify Mark Measure Opinion Perceive Prioritize Prove Rate Recommend Rule on Select Support Value	Adapt Build Change Choose Combine Compile Compose Construct Create Delete Design Develop Discuss Elaborate Estimate Formulate Happen Imagine Improve Invent Make up Maximize Minimize Modify Original Originate Plan Predict Propose Solution Solve Suppose Test Theory

Appendix 2: ABCD Table

Writing Objectives

To write effective learning objectives, use the ABCD model, which include the following parts:

Part	Description	Example
A = Audience	Who is your audience? Who is performing the action?	Given the symbol representing a particular isotope of an atom or ion, the student will be able to determine the number of electrons, protons and neutrons in that species eight out of ten times.
B = Behavior	What will the student be able to do? Behaviors always use a verb or action word. Sometimes you will describe the product or the result of the behavior.	Given the symbol representing a particular isotope of an atom or ion, the student will be able to determine the number of electrons, protons and neutrons in that species eight out of ten times.
C = Condition	How will the student accomplish the task? What information is given? What information is not given? Give the conditions in which performance will occur.	Given the symbol representing a particular isotope of an atom or ion , the student will be able to determine the number of electrons, protons and neutrons in that species eight out of ten times..
D = degree	Describe the minimum criteria for acceptable student performance. <ul style="list-style-type: none"> • How often? • How well? • How many? • How much? Define expectations regarding accuracy, quality, and speed.	Given the symbol representing a particular isotope of an atom or ion, the student will be able to determine the number of electrons, protons and neutrons in that species eight out of ten times .

Appendix 3 Categories and Cognitive Processes (quality as "B" - behaviours in ABCD objectives)

Categories & Cognitive Processes (qualify as "B" – behaviors in ABCD objectives writing method)	Alternative Names	Definitions & Examples
1. Remember – Retrieve relevant knowledge from long-term memory		
1.1 Recognizing	Identifying	Locating knowledge in long-term memory that is consistent with presented material (e.g., Recognize the dates of important events in world history)
1.2 Recalling	Retrieving	Retrieving relevant knowledge from long-term memory (e.g., Recall the dates of important events in U.S. history).
2. Understand – Construct meaning from instructional messages, including oral, written, and graphic communication		
2.1 Interpreting	Clarifying, paraphrasing, representing, translating	Changing from one form of representation (e.g., numerical) to another (e.g. verbal) (e.g. Paraphrase important speeches and documents)
2.2 Exemplifying	Illustrating, instantiating	Finding a specific example or illustration of a concept or principle (e.g., Give examples of various artistic painting styles)
2.3 Classifying	Categorizing, subsuming	Determining that something belongs to a category (e.g., concept or principle) (e.g., Classify observed or described cases of mental disorders)
2.4 Summarizing	Abstracting, generalizing	Abstracting a general theme or major point(s) (e.g., Write a short summary of the events portrayed in a video)
2.5 Inferring	Concluding, extrapolating, interpolating, predicting	Drawing a logical conclusion from presented information (e.g., In learning a foreign language, infer grammatical principles from examples)
2.6 Comparing	Contrasting, mapping, matching	Detecting correspondences between two ideas, objects, and the like (e.g., Compare historical events to contemporary situations)
2.7 Explaining	Constructing models	Constructing a cause-and-effect model of a system (e.g., Explain the causes of important 18 th century events in France)
3. Apply – Carry out or use a procedure in a given situation		
3.1 Executing	Carrying out	Applying a procedure to a familiar task (e.g., Divide one whole number by another whole number, both with multiple digits)
3.2 Implementing	Using	Applying a procedure to an unfamiliar task (e.g. Use Newton's Second Law in situations in which it is appropriate)
4. Analyze – Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or process		
4.1 Differentiating	Discriminating, distinguishing,	Distinguishing relevant from irrelevant parts or important from unimportant part of presented material (e.g. Distinguish between

4.2 Organizing	focusing, selecting Finding coherence, integrating, outlining, parsing, structuring	relevant and irrelevant numbers in a mathematical word problem) Determining how elements fit or function within a structure (e.g. Structure evidence in an argumentative essay into evidence for and against a particular event explanation)
4.3 Attributing	Deconstructing	Determine a point of view, bias, values, or intent underlying presented material (e.g. Determine the point of view of the author of an essay in terms of his or her political perspective)
5. Evaluate – Make judgments based on criteria and standards		
5.1 Checking	Coordinating, detecting, monitoring, testing	Detecting inconsistencies or fallacies within a process or product; determining whether a process or product has internal consistency; detecting the effectiveness of a procedure as it is being implemented (e.g. Determine if a scientist's conclusions follow from observed data)
5.2 Critiquing	Judging	Detecting inconsistencies between a product and external criteria, determining whether a product has external consistency; detecting the appropriateness of a procedure for a given problem (e.g. Judge which of two methods is the best way to solve a given problem)
6. Create – Put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure		
6.1 Generating	Hypothesizing	Coming up with an alternative hypotheses based on criteria (e.g. Generate hypotheses to account for an observed phenomenon)
6.2 Planning	Designing	Devising a procedure for accomplishing some task, (e.g. Plan a research paper on a given economic topic)
6.3 Producing	Constructing	Inventing a product (e.g. Build habitats for a specific purpose)

Source: Anderson, W. L., Krathwohl, R. D. et. al. (eds.). *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Longman: New York, 2001, p. 67-68.

Appendix 4: Intellectual Standards


Intellectual Standards

Below are 14 common standards with closely related words.

STANDARD	Standards words	Opposite
IMPORTANT	considerable, critical, crucial, essential, exigent, imperative, indispensable, necessary, pressing, principal, required, significant, substantial, substantive, urgent, vital, weighty	Unimportant
ACCURATE	certain, conclusive, correct, credible, definitive, factual, reliable, true, undeniable, indisputable, undistorted, indubitable, unquestionable, valid, verifiable	Inaccurate
PRECISE	detailed, exact, methodical, meticulous, painstaking, particular, specific	Imprecise
CLEAR	explicit, intelligible, obvious, perceptible, straightforward, transparent, unambiguous, well-defined	Unclear
RELEVANT	applicable, apposite, cogent, fitting, germane, pertinent, suitable, useful	Irrelevant
ORIGINAL	creative, envisioning, ingenious, innovative, inspiring, inventive paradigm-shifting, seminal, unique	Unoriginal
FEASIBLE	achievable, attainable, likely, plausible, possible, probable, realistic, salient, viable	Infeasible
CONSISTENT	coherent, dependable, logical, reliable	Inconsistent
SUFFICIENT	adequate, conclusive, satisfactory	Insufficient
REASONABLE	careful, cogent, defensible, judicious, justifiable, logical, rational, rigorous, sound, well-founded	Unreasonable
FAIR	above-board, disinterested, equitable, even-handed, impartial, just, unbiased, unprejudiced	Unfair
EXCELLENT	distinguished, exceptional, exemplary, meritorious, notable, outstanding, superior	Poor
DEEP	complex, complicated, intricate, involved, perplexing, thorough	Superficial
BROAD	all-inclusive, comprehensive, embracing, encompassing, open-minded, unbiased	Narrow

(Elder, L. and Paul, R. (2008). The Thinker's Guide to Intellectual Standards: The Words That Name Them and the Criteria That Define Them. Foundation for Critical Thinking Press, pp. 18-23.)

Appendix 5: The first 'Customer service and Sales' draft

Name of Unit 1:	<u>Basic flower shop work and maintenance</u> Customer service and sales					
Reference to the qualification:	Floristry					
Core tasks: Serving customers in sales environment					EQF level: 3 Self-reliant and adaptable?	
<p>Description of the Unit:</p> <p>The unit focuses on <u>general flower shop work and maintenance</u> (customer service in florist (flower) shop).</p> <p>Other maintenance and work place related tasks</p> <ul style="list-style-type: none"> - displaying the products - recognising and tending to flowers and plants in the shop - makes basic/ordinary floral arrangements and sets the price - taking care of cleanliness at the shop - adapts to work community and works responsibly - implementing ecological awareness at work - taking into consideration the safety and responsibility of activities at work <p>Customer service encounter (if language conditions permit) consists of</p> <ul style="list-style-type: none"> - meeting and greeting the customer - finding out the customer needs - helping the customer selecting the right product(s) - finishing the sales process (packing, paying) 						
NQF Level	D	NL	SE	FIN	UK	
Knowledge		Skills			Competence	
<p>The worker is able to describe his/her knowledge about:</p> <ul style="list-style-type: none"> - the processes of the work at a flower shop including customer service - How to assemble, price and pack different kinds of floral arrangements - plants and products and how to inform the customer - the sales process of plants and products - the principles of interacting and co-operating within a working environment - the differences in cultural environment and their situations - health, safety within the workplace - sustainable methods, tools and practices 		<p>The worker is able to:</p> <ul style="list-style-type: none"> - construct standard floral arrangements - use the basic technical skills of floral arrangements - help customers and serve them politely - seek advice when needed - communicate effectively in a foreign language - assess their own work and improve when necessary - receive constructive feedback - work safely - use the appropriate sustainable methods and products - use knowledge of plants and their biology 			<p>The worker understands how to:</p> <ul style="list-style-type: none"> - work self-reliantly and responsibly in a given setting - implement flower shop work and possibly customer service with limited assistance/support - express and receive situation-based criticism - perform the principles of communication and customer service and how to apply them to different settings - implement the needs and values of sustainable materials and working methods 	

4.4.1 Serving customers and shop work in floristry and horticultural business

Vocational skills requirements

The student or candidate is able to

- ⑩ serve customers in a florist's shop or garden centre
- ⑩ advise customers concerning the selection, use and care of plants
- ⑩ make use of information sources
- ⑩ sell and pack floristry or garden centre products and find more information about them and promote product choices that comply with sustainable values
- ⑩ make the most common floral arrangements and write card text related to the work
- ⑩ receive and forward orders and take care of delivering orders
- ⑩ recognise and tend to the plants in the shop
- ⑩ identify natural plants and materials used in the sector
- ⑩ receive, inspect and price products
- ⑩ display products
- ⑩ ensure cleanliness at the shop
- ⑩ function in a work community and appreciate their own work
- ⑩ identify the hazards and harmful effects on health associated with their work
- ⑩ take into consideration the safety and responsibility of activities in their work
- ⑩ maintain ability to work
- ⑩ use appropriate protective equipment for their work assignments
- ⑩ promote operating methods in line with sustainable development.

Assessment

The table comprises the assessment criteria for three levels of competence together with the targets of assessment. In vocational upper secondary education, the targets of assessment also constitute the core contents of the module.

TARGET OF ASSESSMENT	ASSESSMENT CRITERIA		
1. Mastering the work process	Satisfactory 1	Good 2	Excellent 3
	The student or candidate		
Planning own work in customer service and shop work at a florist shop or garden centre	prepare work assignments according to the instructions of the enterprise after receiving initial guidance	plans and prepares work assignments according to the instructions of the enterprise	plans and prepares work assignments on their own initiative and responsibly according to the instructions of the enterprise
	performs work assignments in the order of importance with occasional guidance	performs work assignments in the order of importance	performs work assignments in the order of importance and develops their own work
Implementing customer service and shop work	works as directed in different phases of customer service according to the	mainly works independently in different phases of customer service according to plan	works in different phases of customer service according to plan and with flexibility as required by the situation

	instructions and targets of the enterprise		
	asks for advice when uncertain	asks for advice in new situations	works according to the authority granted
	performs the work for which they are responsible, but needs guidance from time to time	performs the work for which they are responsible	works responsibly and takes the employees performing the next work stages into account in their work
Making floral arrangements	makes typical floral arrangements after receiving initial guidance	makes typical floral arrangements	makes typical floral arrangements promptly and independently
	assesses their own work	assesses their own work and receives feedback	assesses their own work and can alter their operating methods based on feedback
Working in a sustainable way in floristry and horticultural business	recognises phases in individual tasks where the sustainability of customer service work can be improved with expert assistance	recognises phases in individual tasks where the sustainability of customer service work can be improved	recognises phases in work entities where the sustainability of customer service work can be improved
	presents products and services from environmental and other sustainable development aspects according to instructions	presents the environmental and other sustainable development aspects of products and services	presents products and services by comparing environmental and other sustainable development aspects
	sorts and recycles the waste produced according to instructions and takes the environmental friendliness of materials, tools and methods into consideration in their choices.	sorts and recycles the waste produced and takes the environmental friendliness of materials, tools and methods into consideration in their choices.	sorts and recycles the waste produced, takes the environmental friendliness and economy of materials, tools and methods into consideration in their choices and develops activities in a more sustainable direction.

TARGET OF ASSESSMENT	ASSESSMENT CRITERIA		
2. Mastering the work method, equipment and material	Satisfactory 1	Good 2	Excellent 3
	The student or candidate		
Customer service in floristry and horticultural business work	determines customer needs and serves them	determines customer needs and serves them politely	determines customer needs and serves them actively and politely to promote additional sales
	expresses themselves clearly orally and in writing in their native language and uses the most common vocational concepts	expresses themselves clearly orally and in writing in their native language and uses vocational concepts	expresses themselves clearly orally and in writing in their native language and uses vocational concepts fluently
	advises customers in the selection, use and care of plants using professional literature or guidance and	advises customers in the selection, use and care of plants using professional literature and with consideration for plant biology	advises customers in the selection, use and care of plants in a customer-specific manner using professional literature and with

	with consideration for plant biology		consideration for plant biology
Making use of language proficiency in customer service Sector-specific language skills for Finnish speakers	serves customers in Finnish and manages tolerably well in service situations in Swedish and a foreign language	serves customers in Finnish and manages service situations in Swedish and a foreign language	serves customers in Finnish and manages service situations fluently in Swedish and a foreign language
Making use of language proficiency in customer service Sector-specific language skills for Swedish speakers	serves customers in Swedish and manages tolerably well in service situations in Finnish and a foreign language	serves customers in Swedish and manages service situations fluently in Finnish, and manages a service situation in a foreign language	serve customers in Swedish and Finnish and manages service situations fluently in a foreign language
Making use of language proficiency in customer service Sector-specific language skills for native speakers of other languages	manages a service situation in Finnish or Swedish and manages a service situation tolerably well in another language	manages a service situation in Finnish or Swedish and a foreign language, and manages tolerably well in the other national language	serves customers in Finnish or Swedish, manages service situations fluently in the other national language and in a foreign language
Making use of language proficiency in customer service Sector-specific language skills in education in a foreign language	in addition to the language of instruction, manages a service situation in Finnish or Swedish and can further help the customer proceed in a service situation in one other language	in addition to the language of instruction, manages service situations in Finnish or Swedish and in one other language	in addition to the language of instruction, serves customers in Finnish or Swedish and manages service situations fluently in one other language
Selling products in a florist shop or garden centre	sells the product needed by the customer, finds out the price and accepts payment in the most common forms of payment and writes a receipt if necessary	sells the product needed by the customer, knows the price and accepts payment in the most common forms of payment and writes a receipt if necessary	sells the product needed by the customer, knows or calculates the price and accepts payment in the most common forms of payment and writes a receipt if necessary
	accepts orders placed using commonly used methods and delivers a customer complaint for processing after receiving initial guidance	accepts orders placed by commonly used methods and delivers a customer complaint for processing	independently accepts orders placed by commonly used methods and delivers a customer complaint for processing
Working in a florist shop and garden centre	performs day-to-day tasks and ensures the care of living materials and the cleanliness of the facilities, sorts waste and avoids wastage	performs shop work, ensures the care of living materials and the cleanliness of the facilities, sorts waste and avoids wastage	performs shop work promptly and ensures the care of living materials and the cleanliness of the facilities, sorts waste and avoids wastage
	receives, inspects and processes goods deliveries and informs the supervisor of errors after receiving initial guidance	receives, inspects and processes goods deliveries and informs the supervisor of errors	receives, inspects and processes goods deliveries independently and informs the supervisor of errors
	manages the shop's product range and keeps the sales outlet orderly	manages the shop's product range and keeps the sales outlet in order and pleasant	independently manages and develops the shop's product range, keeps the sales outlet in order, pleasant and attractive

Making and packing floral arrangements (bouquets, wreaths and flower arrangements)	makes the most common floral arrangements at a florist shop or garden centre with occasional guidance	makes the most common floral arrangements at a florist shop or garden centre	makes the most common floral arrangements promptly at a florist shop or garden centre
	packs floral arrangements according to the conditions after receiving initial guidance.	packs floral arrangements according to the conditions.	packs floral arrangements quickly according to the conditions.

TARGET OF ASSESSMENT	ASSESSMENT CRITERIA		
3. Underpinning knowledge	Satisfactory 1	Good 2	Excellent 3
	The student or candidate		
Identifying plants in floristry and horticultural business work	identifies the most common plants used in floristry and horticultural business and knows their scientific families	identifies the most common plants used in floristry and horticultural business and knows their scientific names	identifies plants that are less common in floristry and horticultural business and knows their scientific names and can find more information about them from various sources of information
	identifies natural plants and materials used in the sector and takes the regulations associated with gathering them into consideration	identifies the most common natural plants and materials used in the sector and takes the regulations associated with gathering them into consideration in their work	identifies less common natural plants and materials less used in the sector and takes into consideration regulations associated with gathering them
Application of plant biology information in floristry and horticultural business work	applies plant biology information in practical work with occasional requests for assistance	applies plant biology information in practical work	applies plant biology information in practical work and can look for additional information
Applying theories of composition and colour in floristry and horticultural business work	applies information about composition and colour theory with occasional requests for assistance	applies information about composition and colour theory	applies information about composition and colour theory in a diverse manner
Product pricing when working in floristry and horticultural business	can calculate discounts and value-added tax as instructed.	calculates discounts and value-added tax.	calculates discounts and value-added tax independently.
TARGET OF ASSESSMENT	ASSESSMENT CRITERIA		
4. Key competences for lifelong learning	Satisfactory 1	Good 2	Excellent 3
	The student or candidate		

Learning and problem solving	cope with familiar situations in their work assignments	cope with changing situations and those in which a choice needs to be made after negotiating with other members of the work community	functions appropriately in different situations and finds alternative operating methods for their actions
	recognises information-based solutions in their work	applies the knowledge base regarding productive activities in their work with expert assistance	applies the knowledge base regarding quality and productive activities in their work

Interaction and co-operation	works as a member of the work community in familiar interactive situations	adapts well to being a member of the work community, receives feedback, and alters their activities if necessary	works as an equal member of the work community with consideration for the opinions of others
	is able to work with different people in the work community and request assistance if necessary	works with different people in the work community	supports and helps others and takes the employee performing the next work stages into account in their work
	discusses their work at the initiative of others	discusses their work on their own initiative	discusses their work on their own initiative and naturally and wants to develop their co-operation skills
Vocational ethics	acts honestly and responsibly when carrying out tasks assigned to them	acts openly, honestly and responsibly when carrying out tasks assigned to them	bases their work on openness, honesty and responsibility
Health, safety and ability to function	identifies and avoids hazards	avoids accident hazards for themselves and other employees	anticipates the existence of potential hazards, understands the hazards of occupational disease
	uses protective equipment according to instructions and works ergonomically.	uses protective equipment according to instructions and works ergonomically and safely.	uses protective equipment according to instructions, works ergonomically and safely and understands the importance of ergonomics to the lifelong ability to work.

Ways of demonstrating vocational skills

The student or candidate demonstrates their vocational skill by performing seasonal floristry and horticultural business work to an extent that makes it possible to establish that the vocational skills meet the requirements.

A skills demonstration is to comprise the following in their entirety

- ⑩ mastering the work process
- ⑩ mastering the work method, equipment and material
- ⑩ underpinning knowledge
- ⑩ key competences for lifelong learning.

If the vocational skills required in the module cannot be shown in a skills demonstration or a competence test, it is to be completed with such other assessment of competence as interviews, assignments and other reliable methods.

Appendix 7.

The Finnish National Qualifications Framework

https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Finland:National_Qualifications_Framework

The Finnish National Qualifications Framework was adopted in March 2017, when the legislation governing the National Framework for Qualifications and Other Competence Modules entered force. The Ministry of Education and Culture and the Finnish National Agency for Education have been involved with the European Qualifications Framework for Lifelong Learning from the very beginning. The decision that a Finnish National Qualifications Framework should be developed was made already in 2008. There were several delays in the legislative processes but regardless of the delays, the proposal for the National Qualifications Framework was well known among major stakeholders, especially education providers.

Information on the National Framework for Qualifications and Other Competence Modules, including legislation governing the framework as well as its design is available on the Finnish National Agency for Education's website: <http://www.oph.fi/qualificationsframework>

A broad range of stakeholders have been involved since the early stages of the NQF developments. Broad consultation and information sessions were organised throughout the process. The original (2008) NQF working group, which was chaired by the Ministry of Education and Culture, included the following stakeholders: the Ministry of Justice, Ministry of the Interior, Ministry of Employment and the Economy, Defence Command Finland (Ministry of Defence), Finnish National Board of Education², Confederation of Unions for Professional and Managerial Staff in Finland (AKAVA), Confederation of Finnish Industries (EK), Central Organisation of Finnish Trade Unions (SAK), Association of Finnish Local and Regional Authorities, Finnish Confederation of Professionals (STTK), the Association of Vocational Adult Education Centres (AKKL), Rectors' Conference of Finnish Universities of Applied Sciences (ARENE), Vocational Education Providers in Finland (KJY), Finnish Association of Principals, The Finnish Council of University Rectors, Finnish Adult Education Association, the National Union of University Students in Finland (SYL) and the Union of Finnish Upper Secondary Students in Finland.

The Finnish National Qualifications Framework was seen as a tool for transparency, that facilitates overall scrutiny of the Finnish education and qualifications system by describing the learning outcomes required by qualifications, syllabi and extensive competence modules in a uniform, comprehensible and comparable manner; and by defining their interrelations. The Finnish National Qualifications Framework adds to the Lifelong Learning opportunities and practices both by describing learning outcomes on all levels of education and by making recognition of prior learning easier. The framework also brings about increased national and international transparency and comparability of qualifications and thus promotes international mobility, recognition of qualifications and supports educational co-operation and education export.

The Finnish National Qualifications Framework is an overarching framework and it is compatible both with the European Qualifications Framework for Lifelong Learning (EQF) and the Qualifications Framework for the European Higher Education Area. In the Finnish National Qualifications Framework qualifications, syllabi and other extensive competence modules of the Finnish national education and qualifications system are classified into eight levels on the basis on their learning outcomes. The learning outcomes approach is well-established and generally accepted in the vocational education and training, it also has a long history in this sector of education. Also, higher education institutions, notably the universities of applied sciences, are moving towards learning outcomes based qualifications. In the level descriptors, a distinction is not made between knowledge, skills and competences. Instead, the learning outcomes are described in a holistic way, as one unified descriptor.

In the first stage, the Finnish National Qualifications Framework encompasses qualifications and syllabi that are governed by the Ministry of Education and Culture and qualifications from other administrative sectors. The qualifications that are referenced to the Finnish National Qualifications Framework are referred to in the Government Decree.

The Finnish National Qualifications Framework will be further developed towards a wider framework for learning, by incorporating for example certain extensive competence modules which are a qualification requirement for a certain position, or relate to the improvement of professional skills and competence. As the framework evolves, the level descriptors may be revised. The development work will be steered by the Ministry of Education and Culture, which appointed the Finnish National Agency for Education as the National Co-ordination Point already in 2008. The tasks of the Finnish National Agency for Education are closely linked with the National Qualifications Framework, notably the

regulations concerning the qualification requirements. The Finnish National Agency for Education also has the main responsibility over sharing information both nationally and internationally.

Previous information:

On 21 August 2008, the Ministry of Education appointed a committee to prepare a national qualifications framework describing qualifications and other learning. The task of the committee was to prepare a proposal on the national qualifications framework and to define its levels in terms of knowledge, skills and competences; to determine the criteria according to which the qualifications are placed on the different levels of the national and European qualifications frameworks; and to propose which levels Finnish qualifications should be placed on in the frameworks. The committee's task was also to propose how the national qualifications framework ought to be maintained, updated and developed, and to describe how the quality assurance will be arranged. The committee also had to make a proposal on whether the national framework could be extended to cover all learning in addition to formal qualifications. The committee was also to make a proposal on the necessary legislative reforms.

In its report, the committee describes the European qualifications framework (EQF) and how it relates to other qualification classifications. The committee also describes how qualifications and learning outcomes are described in national legislation. Furthermore, the committee describes the quality assurance procedures for Finnish degrees and education, the current state and practices of recognising learning, and the measures that have been taken in different administrative sectors to promote the recognition of learning. The committee's key proposals are as follows:

The definitions below are based on the definitions in the EQF recommendation (2008/C 111/01) Appendix 1.

national qualifications system: means all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. This includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework. Subsystems of a national qualifications system may include, for example, a vocational qualifications system and higher education qualifications system.

national qualifications framework: means an instrument for the classification of qualifications according to a set of criteria and placement in the EQF.

learning outcomes: means statements of what a learner knows, understands and is able to do on completion of a learning process. In the context of the European Qualifications Framework, learning outcomes are defined in terms of knowledge, skills and competence. In the Finnish framework, learning outcomes is defined as follows: a combination of knowledge, skills and competence; a wide-ranging ability to utilise knowledge, skills and proficiency in work and study situations and as a member of society.

competence: means the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy.

skills: means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

qualification levels: the national qualifications framework aims to improve the international comparability of qualifications and to promote validation of prior learning as well as lifelong learning. In addition, the national qualifications framework aims to integrate and coordinate national qualifications subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society.

knowledge: means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual.