



Handbook

Measuring the impact of learning



This project has been funded with support from the European Commission.

This publication (communication) reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Project: 2019-1-NL01-KA202-060342



Inhoud

Measuring the impact of learning	3
Six levels	4
Learning objectives.....	4
Steps towards writing effective learning objectives	4
Pitfall.....	5
Measuring starts before the program is created	6
Annex 1: Kirkpatrick's model.....	7
Annex 2: Examples of evaluation forms	9



Measuring the impact of learning

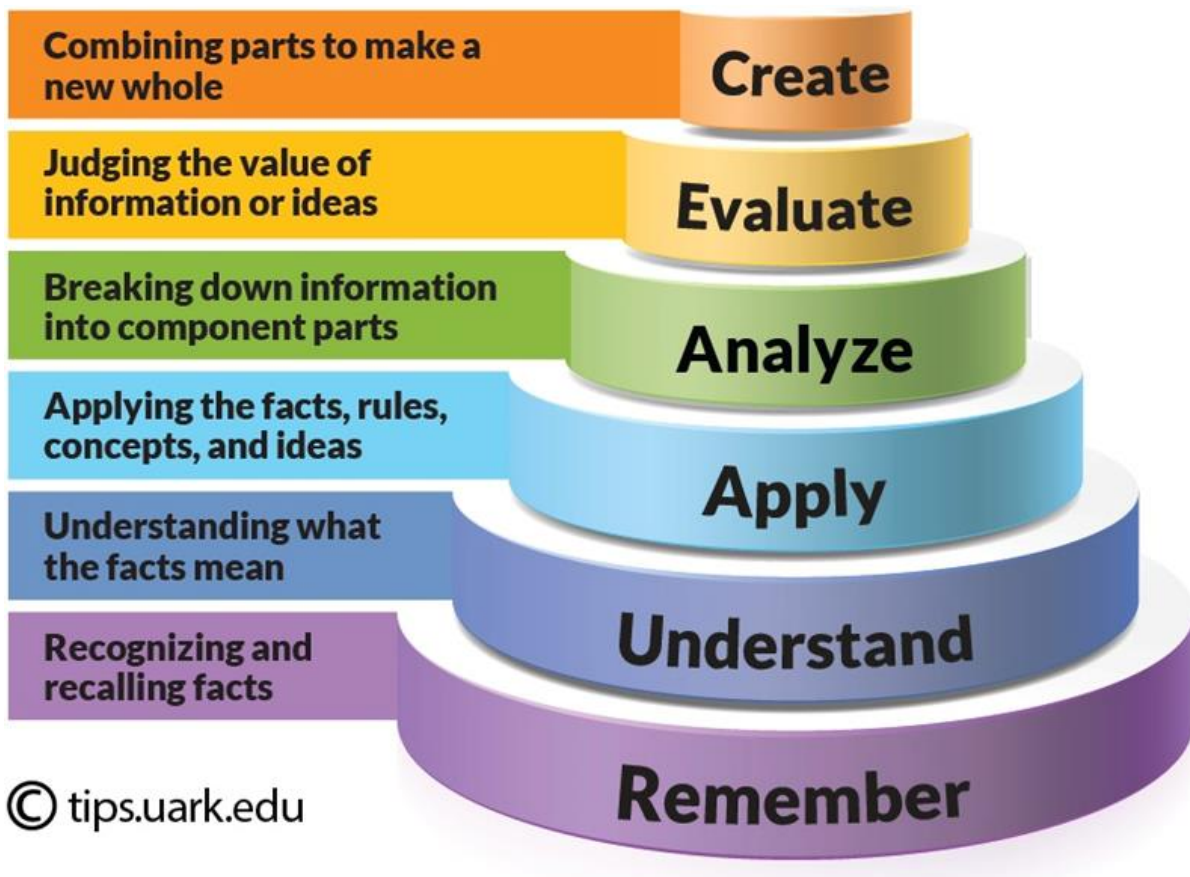
One could say that the impact of learning is the difference in students' knowledge, skills or behaviour at the end of a lesson or course, compared with the level at the start. As a result of that, the intended outcome should be measurable.

So when designing a lesson or a combination of those in a course, the developer should start with a description of the target group and the start level. It might be helpful to use a person's name. *Stewart is a 17-year old male, who's in the second year of vocational school at level 3. He is supposed to know the 4 main claw diseases and how to prevent them. During his traineeships at the farm, he's assisting the farmer at hoof trimming. Therefore he's presumed to recognise the most common diseases and how preventive treatment has to be carried out.*

In order to determine the start level of knowledge and skills performances, the developer could use a tool e.g. a written test and / or skills performance or survey. Discussion and communication with the learner about demands and gaps, could also be useful.

Subsequently and based upon that together with the required outcome, the learning objectives will be determined. Logically they have affiliation with the basic level. In order to structure the learning objectives, lessons and assessments in a course these 6 levels might be helpful.

Table1: Bloom's taxonomies



© tips.uark.edu



Six levels

Remembering: Retrieving, recognizing, and recalling relevant knowledge from long-term memory.

Understanding: Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.

Applying: Carrying out or using a procedure for executing, or implementing.

Analyzing: Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.

Evaluating: Making judgments based on criteria and standards through checking and critiquing.

Creating: Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

Although Bloom's taxonomies is hierarchical, meaning that learning at the higher levels is dependent on having attained prerequisite knowledge and skills on lower levels, it's not always useful to start with lower order levels all the way through. That approach would become tedious and not challenging for students who want to develop their "21st century skills" as there are for example: communication, collaboration, creativity and critical thinking.

Learning objectives

Creating impact starts with ambitious learning objectives and creating a context rich environment in which participants, inspired by surrounding parties (including participating companies), produce professional products to prove their development. Feed-forward and feedback is supposed to be continuously part of the learning process. Designing a course means that when learning objectives are determined, at the same time the tools to measure those, are set.

Steps towards writing effective learning objectives

- Make sure there is one measurable verb¹ in each objective.
- Each objective needs one verb. Either a student can master the objective, or they fail to master it. If an objective has two verbs (*say, define and apply*), what happens if a student can define, but not apply?
- Ensure that the verbs in the course level objective are *at least* at the highest Bloom's Taxonomy as the highest lesson level objectives that support it.
- Strive to keep all your learning objectives measurable, clear and concise.

When you are ready to write, it can be helpful to list the level of Bloom's next to the verb you choose in parentheses. For example course level objective 1.

- (*apply*) Demonstrate how transportation is a critical link in the supply chain.
- (*understand*) Discuss the changing global landscape for businesses and other organizations that are driving change in the global environment.
- (*apply*) Demonstrate the special nature of transportation demand and the influence of transportation on companies and their supply chains operating in a global economy.

¹ Table 2



This trick will help you quickly see what level verbs you have. It will also let you check that the course level objective is *at least* as high of a Bloom’s level as any of the lesson level objectives underneath.

Table 2: Key verbs related to Bloom’s level

Bloom’s level	Key verbs (key words)
Create	design, formulate, build, invent, create, compose, generate, derive, modify, develop
Evaluate	choose, support, relate, determine, defend, judge, grade, compare, contrast, argue, justify, support, convince, select, evaluate
Analyse	classify, break down, categorize, analyse, diagram, illustrate, criticize, simplify, associate
Apply	calculate, predict, apply, solve, illustrate, demonstrate, determine, model, perform, present
Understand	describe, explain, paraphrase, restate, give original examples of, summarize, contrast, interpret, discuss
Remember	List, recite, outline, define, name, match, quote, recall, identify, label, recognize

Encouraging the development of 21st Century skills like there are, communication, collaboration, critical thinking and creativity, verbs of the upper levels should be used. Next, the assignments and / or professional products, need a comparable level requiring (parts of) these skills.

Pitfall

Watch out for verbs that are not measurable. In order for an objective to give maximum structure to instruction, it should be free of vague or ambiguous words or phrases. The following lists notoriously ambiguous words or phrases which should be avoided so that the intended outcome is concise and explicit.

Table 3: Words and phrases to avoid

Words to avoid		
believe	comprehend	memorize
hear	know	think
realize	see	experience
capacity	conceptualize	perceive
intelligence	listen	understand
recognize	Sel-actualize	feel

Phrases to avoid		
to become	Capable of	Interested in
to reduce	Comprehension of	Knowledge of
Appreciation for	Cognizant of	Knowledgeable about
Acquainted with	Enjoyment of	Understanding of
Adjusted to	Conscious of	
Awareness of	Familiar with	

After completion of the learning objectives it is important to determine the (evaluation) tools in order to measure the learning process and if the goals have been achieved



Table 4: ideas for tools to evaluate learning objectives

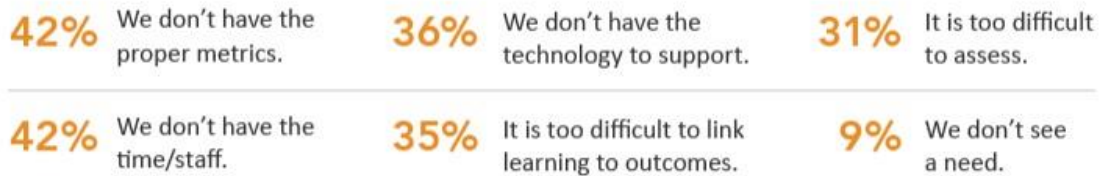
written test	quiz	attendance
oral test	practical assignment	participate in classroom discussion
individual assessment	individual assignment	compose wiki
group assessment	group assignment	participation in chat forum
written review	survey	wordlist
interview (STARR)	video tape	compose web quest
work sample	power point presentation	up to student
portfolio evidence	report	other namely.....

Measuring starts before the program is created

Most learning measurement is relatively basic, focusing on completion rates, test scores, and smile sheets. That is because this type of measurement is easy. It takes almost no effort to track these elements, as the processes are essentially automated. But companies aren't failing to measure more meaningful metrics because they don't think they should. Only 9 percent of companies say they don't see a need to measure learning at Kirkpatrick² Levels 3 and 4. Beyond that, there are many reasons there isn't enough measurement at these levels.

Table 5: Reasons for lack of level 3 & 4 measurement

Reasons for Lack of Level 3 & 4 Measurement



Source: 2020 Brandon Hall Group Learning Measurement Study

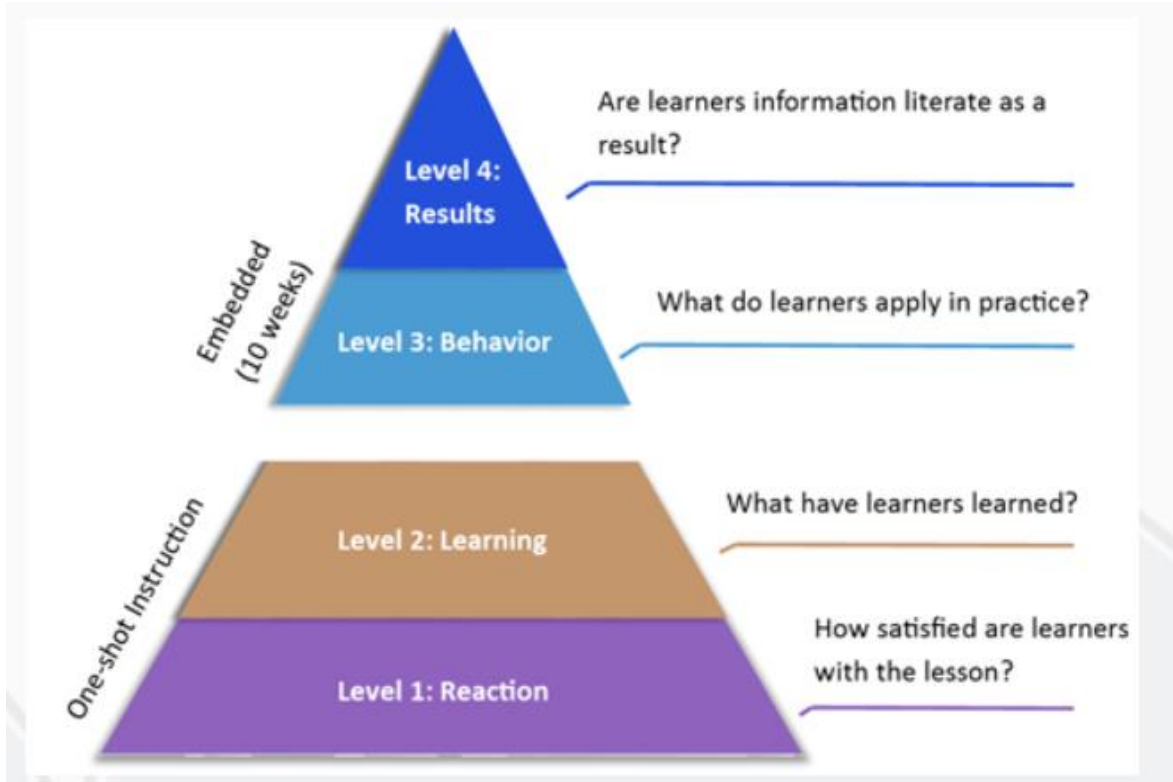
The problem doesn't begin with measurement, however. It starts before the program is even created. Another important issue is that the learners should have the basic competence of self-reflection. With self-reflection, we look at ourselves with interest, curiosity, and inquiry, particularly when exploring our thoughts, behaviours, and emotions.

² Annex 1



Annex 1: Kirkpatrick’s model

The Kirkpatrick Model is a globally recognized method of evaluating the results of training and learning programs. It assesses both formal and informal training methods and rates them against four levels of criteria: reaction, learning, behaviour, and results.



EVALUATION CATEGORY	TRAINER-CENTERED	LEARNER-CENTERED
PROGRAM OBJECTIVES	<ul style="list-style-type: none"> The program objectives were clearly defined. The program objectives were covered by the instructor. The material was the right level of complexity for my background. 	<ul style="list-style-type: none"> I understood the learning objectives. I was able to relate each of the learning objectives to the learning I achieved. I was appropriately challenged by the material.
COURSE MATERIALS	<ul style="list-style-type: none"> The course materials were well organized. The course materials complemented the course content. 	<ul style="list-style-type: none"> I found the course materials easy to navigate. I felt that the course materials will be essential for my success.
CONTENT RELEVANCE	<ul style="list-style-type: none"> The material was relevant to my needs. 	<ul style="list-style-type: none"> I will be able to immediately apply what I learned.
FACILITATOR KNOWLEDGE	<ul style="list-style-type: none"> The facilitator demonstrated a good understanding of the material. The facilitator shared his/her experiences in regards to the content. 	<ul style="list-style-type: none"> My learning was enhanced by the knowledge of the facilitator. My learning was enhanced by the experiences shared by the facilitator.



Kirkpatrick's Level 1: Reaction

The first level of criteria is “reaction,” which measures whether learners find the training engaging, favourable, and relevant to their jobs. This level is most commonly assessed by an after-training survey (often referred to as a “smile sheet”) that asks students to rate their experience.

A crucial component of Level 1 analysis is a focus on the learner versus the trainer. While it may feel natural for a facilitator to fixate on the training outcome (such as content or learning environment), the Kirkpatrick Model encourages survey questions that concentrate on the learner’s takeaways.

Kirkpatrick's Level 2: Learning

Level 2 gauges the learning of each participant based on whether learners acquire the intended knowledge, skills, attitude, confidence and commitment to the training. Learning can be evaluated through both formal and informal methods, and should be evaluated through pre-learning and post-learning assessments to identify accuracy and comprehension.

Methods of assessment include exams or interview-style evaluations. A defined, clear scoring process must be determined in advance to reduce inconsistencies.

Levels three and four that are discussed below mainly have an effect at the organizational level. Does the learning intervention provide a solution to the problem?

Kirkpatrick's Level 3: Behaviour

One of the most crucial steps in the Kirkpatrick Model, Level 3 measures whether participants were truly impacted by the learning and if they’re applying what they learn. Assessing behavioural changes makes it possible to know not only whether the skills were understood, but if it's logistically possible to use the skills in the workplace.

Oftentimes, evaluating behaviour uncovers issues within the workplace. A lack of behavioural change may not mean training was ineffective, but that the organization’s current processes and cultural conditions aren’t fostering an ideal learning environment for the desired change.

Effectively measuring behaviour is a longer-term process that should take place over weeks or months following the initial training.

Kirkpatrick's Level 4: Results

The final level, Level 4, is dedicated to measuring direct results. Level Four measures the learning against an organization's business outcomes— the Key Performance Indicators that were established before learning was initiated. Common KPI’s include higher return on investments, less workplace accidents, and larger quantity of sales.

Using the Kirkpatrick Model creates an actionable measurement plan to clearly define goals, measure results and identify areas of notable impact. Analysing data at each level allows organizations to evaluate the relationship between each level to better understand the training results— and, as an added benefit, allows organizations to readjust plans and correct course throughout the learning process.



Here are some outcomes to consider, depending on the objectives of your training:

- Increased employee retention.
- Increased production.
- Higher morale.
- Reduced waste.
- Increased sales.
- Higher-quality ratings.
- Increased customer satisfaction.
- Fewer staff complaints.

Annex 2: Examples of evaluation forms

A part of one of the evaluation forms is demonstrated below and some have been uploaded, separately from this handbook.

Amoove project Pilot 4: Milkprocessing from 26-9-2022 to 7 Oct 2022 at Aeres Leeuwarden						
		2 = disliked	4 = didn't like	6 = liked	8 = liked it very much	
Day	Date	Time	Content	AVERAGE	ST.DEV.	
Sun	25-9-2022		Arrivals and travelling	7,0	1,10	
Mon	26-09-22	9:00-10:00	Welcome and program	6,3	0,76	
		10:15-11:45	Getting to know each other, learning objectives in general	6,0	0,00	
		12:30-14:15	Introduction hygiene and safety in processing hall + labs	6,0	0,00	
		14:30-16:00	To taste dairy products (cheese, yoghurt)	6,9	1,07	
		18:00	Take away meal	7,4	0,98	
		10:15-11:45	Excursion Rotgans Family Farm Lely Orbiter	7,7	0,76	
		13:00-14:30	Excursion to Klaver Koe and Goat	7,7	0,76	
		16:00	Escape tour in the City of Leeuwarden	5,7	1,38	
Wed	28-09-22	9-10:00	Theory milk and cheese	6,0	1,15	
		10:15 - 16:00	Cheese processing in bucket	6,9	1,07	
Thu	29-09-22	9:00 - 16:00	Cheese processing in curd maker	7,1	1,07	
Fri	30-09-22	09:00-10:00	Theory	6,0	1,15	
		10:15 - 16:00	Micro-biology at laboratorium	7,4	0,98	
Sat	1-10-22	08:00	Free time	7,1	1,57	
		13:00 - 15:00	Fierljep Clinic	6,3	1,38	
Sun	2-10-2022	11:00	Farm visits to the Dutch participants + Amsterdam	7,3	1,03	
Mon	3-10-22	10:00-12:00	Coating cheese + sampling cheese	6,0	1,15	
		13.00 - 16.00	Excursion DSM/ CSK	5,1	1,95	
Tue	4-10-2022	9:00 - 11:45	Chemical laboratory	6,0	2,00	
		13:30-16:00	Excursion to The Gelder	7,4	0,98	
Wed	5-10-22	10:15-11:45	Cheese coating and results of micro-biology tests	6,3	1,80	
		12:30 - 16:00	Free time	8,0	0,00	
Thu	6-10-2022	09:30-11:30	Visit cheese factory	7,7	0,82	
		13:30-14:30	Groupdiscussion, evaluation	6,7	1,03	
		14.30 - 15.30	Theoretical test	6,3	1,38	
		15:30-17:00	Social activity with Equine Alkmaar	6,9	1,07	
		17:00-20:00	Bar Van Hall + Diner with students + teachers	7,1	1,07	
Fri	7-10-22	09:00-10:00	Preparing presentations	6,0	1,63	
		10:15-11:45	Presentations	5,4	1,90	
		12:30-14:15	Farewell session	6,0	1,26	
		14:30-16:00	Social activity - Escape room	6,8	1,10	