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## Training Outcome Evaluation Model

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### Abstract

Kirkpatrick's model has many adaptations to various fields of training, by using 4 level evaluations. The new eQvet-us training outcome evaluation model developed in this paper, consist in an improvement of the Kirkpatrick's model by associating to the evaluation level the corresponding objectives. In this way two levels are deduced, that are following the PDCA cycle in opposite senses. The objectives' level consists in outcome, performance, knowledge, motivation, that is associated to the classical evaluation level compost of reaction, learning, behavior and result evaluations. To evaluate the effectiveness of the proposed approach, an experiment was conducted for a VET course for quality professionals in services industry. It was demonstrated that the methodology not only help the training professional plan the intervention, but help the trainees employers understand the factors that facilitate training transfer and produce business results. By using the tool, we have demonstrated post-training value for stakeholders.

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**Keywords:** Kirkpatrick's model; PDCA cycle; training evaluation model; pedagogical approach, competence based systems.

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### 1. Introduction

Kirkpatrick's model has many adaptations to evaluate technical communication products and services [5, 6, 13] like assessment of learning outcomes in higher education [19, 20], performance of medical educators [21], participation in research methodology workshops [1], online general education information literacy materials [7], blended-learning professional development program for teachers [22], etc. But, the evaluation model is usually used in enterprises for vocational education and training evaluation of short duration courses [8, 9], for example safety

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training for petrochemical plant [10], simulation-based training of carrier flight deck crew in aviation [24], etc.

So far, most common method for evaluating transfer of training is questionnaire. For example, Smith and Ericson [23] have used in an experiment questionnaires as pre-quiz and post-quiz in order to measure trainees' learning effectiveness. Along with the many advantages of the methodology [2], Bates [4] argues that in particular cases the model limits the capacity of training.

"Petru Maior" University of Tirgu Mures (UPM) in partnership with other vocational education training institutions in Europe have developed the eQvet-us project entitled "European Quality Assurance in VET towards new Eco Skills and Environmentally Sustainable Economy" [25] with the objectives to design and evaluate a pedagogical approach which can enhance core competencies of trainees in Vocational Education and Training (VET) and to innovate technology enhancement strategies that can create an effective collaborative peer assisted learning and assessment environment [14, 15, 16, 17].

This paper discusses a new paradigm based on the Kirkpatrick's model, the innovative training outcome evaluation model. It provides instant evaluation in industry oriented short, intense VET professionals' courses as well as after return to work, with means of innovative learning outcome evaluation model by using modern, easy to use response technology [11, 12], in order to include assessment for learning in competence based systems [18].

## 2. The 4 Level evaluation methodology

Kirkpatrick described four levels of evaluation in which the complexity of the behavioral change increases as evaluation strategies ascend to each higher level. According to the Kirkpatrick methodology, by employment of mobile technology and free available software Google Forms [26] the teaching innovation of the eQvet-us consortium delivered by UPM and partnership is evaluated at levels of reaction, learning, behavior, and result (Figure 1).

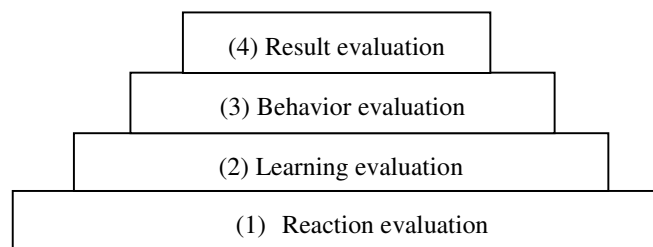


Fig. 1. Kirkpatrick's hierarchy of evaluation levels.

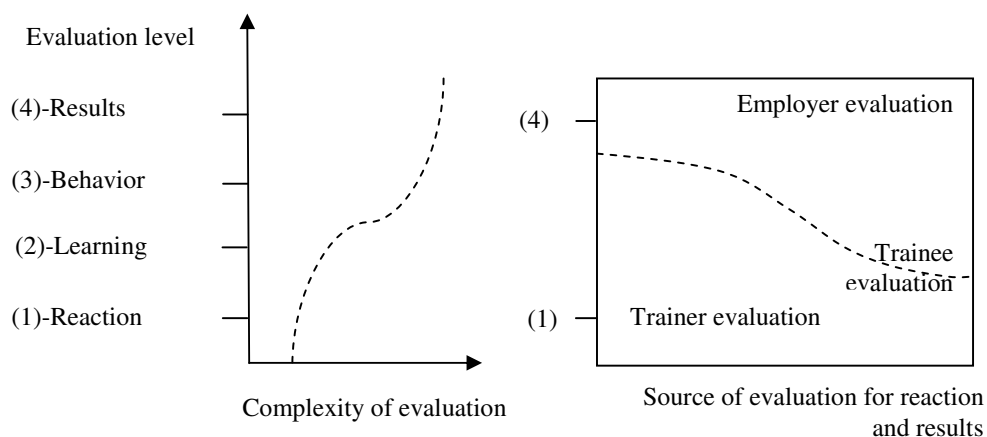


Fig. 2. Complexity of evaluation hierarchy.

It is hard to realize the full four level evaluations and it is difficult to carry out the Kirkpatrick's model from the first level to the fourth level. As proceeding at each level, the evaluation becomes more difficult and requires more time.

Complexity of evaluation increases as evaluation of intervention ascends the hierarchy, as demonstrated in figure 2. At the first two levels the trainee evaluation is dominant in relevance, while at the last two levels the employer evaluation is dominant in relevance.

Organizational constraints substantially limit opportunities for collecting results data, so when applying the model training providers might have unrealistic expectations with regard to results level outcomes.

### 3. eQvet-us training outcome evaluation model

The new eQvet-us training outcome evaluation model is going to be used to measure information about trainee and course in various moments, as depicted in figure 3.

Reaction is measured from just before the course starts, and these data will be collated with immediate feedback from tests offered towards the end of the course, collecting information from trainees about their impression, what they felt, course content, teacher ability to deliver training, handouts, infrastructure, etc. Learning is measured after the beginning of the course using intermediate and final assessments and exams.

Behavior evaluation is performed after 2-3 month the course is ended with information from graduates and employer. The objective is to explore the usefulness of the course for the graduate and enterprise.

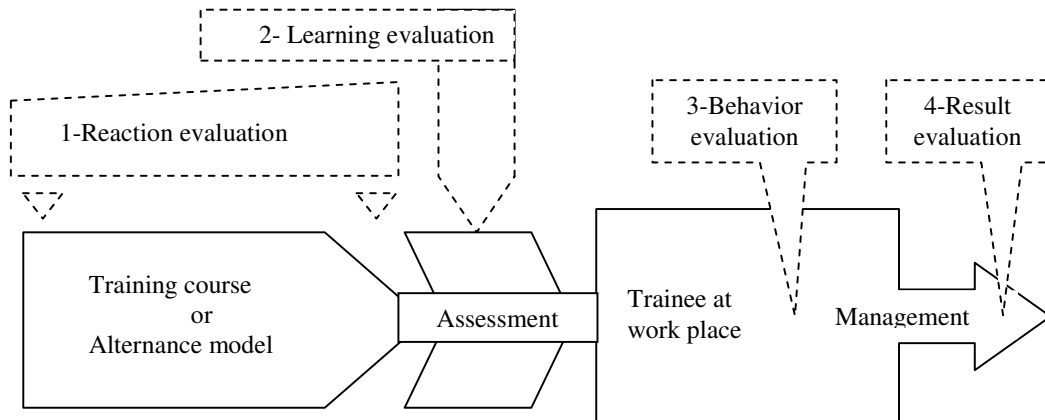


Fig. 3. The process of training evaluation.

The result evaluation is performed 4-6 month after the course is completed with information also from graduates and mainly from employer in order to explore the return of investment of the course.

The data gathered before and after the course are then merged into an interactive learning and evaluation activity. The learning approach targets short, intense training courses and applies the pedagogical method to environmental courses.

During the design and development phase, trainer should thinking about the post-training evaluation of the trainees and evaluation of the training materials themselves:

- Determine if it's appropriate to provide a pre-test that would allow the trainee to skip the training if he/she can pass the pre-test and, if so, to develop the pre-test,
- Determine how the trainees will be evaluated post-training,
- Determine what the trainee must do to successfully complete the evaluation,
- Create procedures for helping or retraining workers who do not successfully complete the evaluation.

Then the trainer should turn the attention to the nature of effective evaluations, first the evaluation of the trainee should be based on the trainee's ability to satisfy the learning objectives for the training. In addition, the all, of the following approaches:

- **Learner reaction:** Surveys or other methods to get the trainees feedback about the training, including how well they learned, how well the training materials were designed, and how well the trainer performed.
- **Knowledge, skill, ability evaluation/test:** This can include a written test, oral exam, a demonstration of a real-life job skill in the real or simulated work environment, the completion of a project, or other forms of evaluation. The test should align with the learning objective and the type of test will be influenced by the learning objective. Pre-tests and post-tests may be used as a way to determine how much the trainees learned. Technology, including online or computerized assessments, may be used.
- **On-the-job performance observation:** Observing the employee's real on-the-job behavior at the workplace to see if the employee is correctly applying the knowledge, skills, abilities, or attitudes the training was intended to convey. This may include a comparison of observations made before and after training, and can include observations from customers, co-workers.
- **Effect of training on organization as a whole:** Analyzing data to determine the effect of the training on key performance indicators such as: member satisfaction, client satisfaction, safety behaviors; higher revenues, return of investment, etc.

The innovative eQvet-us evaluation model, consist in an improvement of the Kirkpatrick's model by associating to the evaluations the corresponding objectives, as presented in table 1 and depicted in figure 1, which consist in two levels:

- objectives (Table 1 - left column; Figure 4 – the inner circle) and
- evaluations (Table 1 - right column; Figure 4 - the outside circle).

Table 1. Evaluation model levels.

Objective phase	Objectives	Evaluations	Evaluation phase
Act	Motivation: What must the trainees perceive in order to learn and perform?	Reaction: Are the trainees motivated to learn?	Plan
Check	Knowledge: What new knowledge, skills and resources do trainees need in order to perform?	Learning: Did the trainees learn the needed skills and use the resources they were given?	Do
Do	Performance: What must the trainee be able to perform in order to achieve the organizational objective?	Behavior: Did the trainees transfer the skills to the workplace?	Check
Plan	Outcome: What is the organizational goal to improve the business?	Result: Is the desired organizational impact being felt?	Act

In the eQvet-us evaluation model the two levels, objectives and evaluations, are following the PDCA cycle in opposite senses. In planning a VET training an organization starts with the objectives planning, the desired outcome, the organizational goal to improve the business. Then the work requirements are elaborated, the support for the skills acquired during the training. Finally in the acting phase, the trainees' stimulants for learning are elaborated. In the next level, the evaluation consists in (see Figures 1, and 4):

- (1) *Reaction evaluation:* measure how trainee thought and felt about the training and learning experience during the training course or by using the alternance model;
- (2) *Learning evaluation:* measure the increase in knowledge or capability before and during the course, in order to provide corrective actions at the end of the course;
- (3) *Behavior evaluation:* measure the extent of applied learning back on the job (implementation of knowledge);
- (4) *Result evaluation:* investigate the effects on the business or environment resulting from the trainee's performance, and try to assess and validate the Return of Investment in VET programs by using the extended Kirkpatrick's evaluation model.

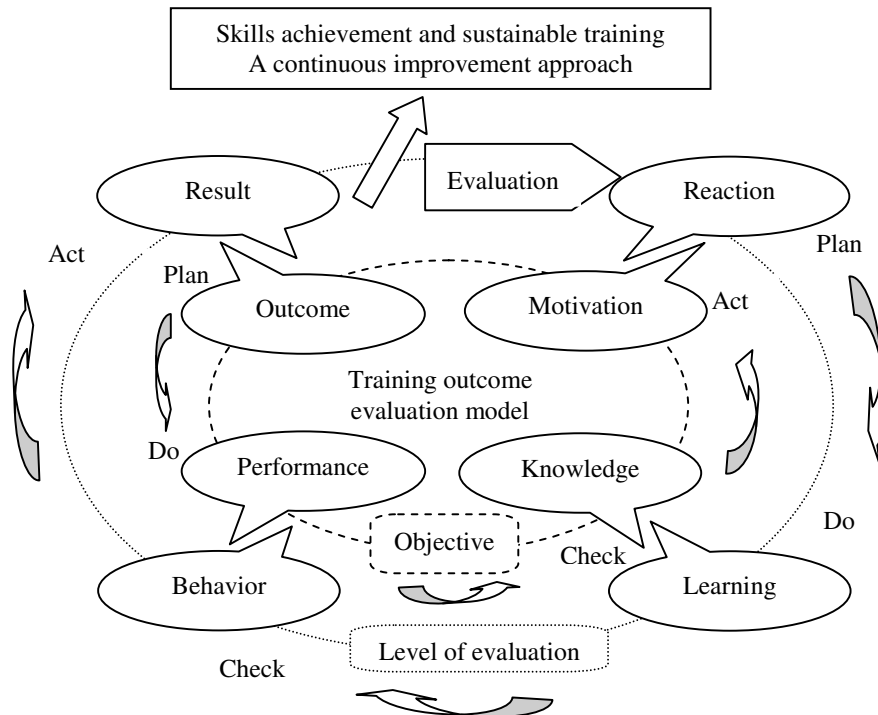


Fig. 4. eQvet-us training outcome evaluation model.

In addition, it aids the troubling-shooting process. For example, if you know the trainees learned their skills but do not use them in the work environment, then the two more likely troublesome areas become apparent as they are normally in the cell itself (in this example on Figure 4, the Performance cells) or the cell in relation with it (Behavior):

- There is a process in the work environment that constrains the performers from using their new skills, or
- The initial premise that the new skills would bring about change is wrong.

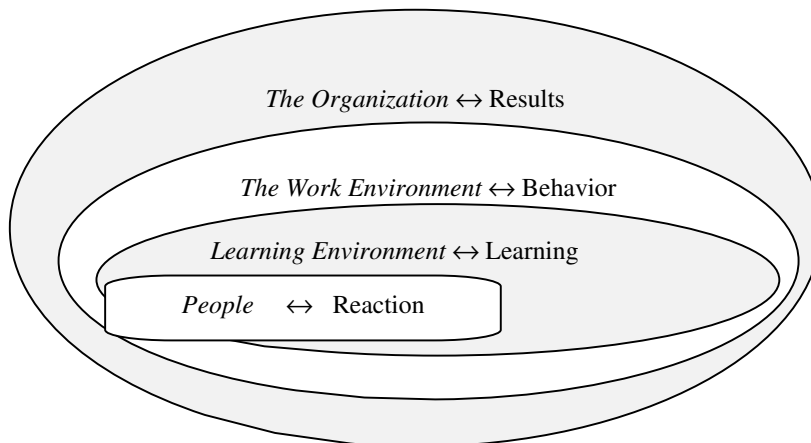


Fig. 5. Learning and work environment.

The diagram in Figure 5 shows the environment of evaluation, and inclusion of the evaluation processes in order to fit together. As the above diagram shows, the Results evaluation is of the most interest to the business leaders, while the other three evaluations (Behavior, Learning, and Reaction) are essential to the training designers for planning and evaluating their training processes; of course the Results evaluation is also important to them as it gives them a goal for improving the business.

#### 4. Case study

In order to validate the proposed methodology we have tested the model in a short duration VET course for quality professionals working in services industry delivered by UPM.

In the Objective level the questions and problems addressed in the 4 phases of the PDCA cycle, were developed according to descriptions in Table 1.

The outcome in the Plan phase consist in the organizational goal to improve the business by increasing of services with 30%, increased profits, member satisfaction, satisfied customers, frontline staff that can identify needs, recommend solutions.

In the Do phase the performance consist in what must the trainee be able to perform in order to achieve the organizational objective. Frontline staff will identify members' needs by reviewing their client profile and asking questions during each transaction. Once a need is identified, staff makes a recommendation, usually a product or service that will meet the need. Staff will also highlight the benefit of the solution by showing how it saves time, money and/or provides peace of mind.

In the Check phase the new knowledge, skills and resources trainees need were established in order to perform: quality services, client consultation, identify the gaps between what clients expect or need from the organization and the service they feel they are actually receiving; measuring client satisfaction. With this information the training content was designed, consisting in client consultation process: client consultation as a way of doing business; client consultation in the decision-making process; client consultation in implementing new initiatives.

In the Act phase the trainees' motivation was analyzed. In order to ensure that trainees perceive the value of what is presented in the course, they must see training as an opportunity, as a way to address a need they have, and as a way to achieve valued outcomes. Trainees must perceive the organization and their immediate work environment as a supporting participation in training.

In the next level of Evaluation it was developed four questionnaires for each kind of evaluation that are exemplified with selected questions:

Reaction: How valuable have you found the programme to be?

Learning: How much effort have you made to apply your learning? How much support have you received when applying your learning?

Behavior: As a result of the programme, how would you rate your attitude towards your job? What are your changes to job behavior? What level of practical application have you been able to achieve?

Result: Have you noticed any changes in the behaviour of those around you? How strongly do you believe that your company is committed to the objectives of the programme?

At the end of the pilot testing it was appreciated the utility of the proposed methodology and observed that once the initiative has been rolled out, it is important to gather relevant quantitative and qualitative data to make sure that value is being added all along the way, and that the required leading indicators levels 3 and 4 are pointing the way to ultimate mission and business success.

#### 5. Conclusion

Kirkpatrick's model has many adaptations to various fields of training, by using 4 level evaluations. The new eQvet-us training outcome evaluation model developed in this paper, consist in an improvement of the Kirkpatrick's model by associating to the evaluation level the corresponding objectives. In this way two levels are deduced, that are following the PDCA cycle phases in opposite senses. The objectives' level consists in outcome performance, knowledge, motivation, that is associated to the classical evaluation level compost of reaction, learning, behavior and result evaluations. To evaluate the effectiveness of the proposed approach, an experiment was conducted for a

VET course for quality professionals in services industry. The course was designed and evaluated according to the proposed methodology. It was demonstrate that the methodology not only help the training professional plan the intervention, but help the trainees employers understand the factors that facilitate training transfer and produce business results. By using the tool, we have demonstrated post-training value for stakeholders.

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