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Essential Instructional Design Competences for Professional Driver Trainers

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Del.: 09-11 ▫ WP: 04 ▫ Last update: February 2014

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This project has been funded with support from the European Commission.
This publication reflects the views only of the author, and the Commission cannot be held
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1 Introduction

This paper represents in section two a concise summary of the essential Instructional Design (ID) competencies for Trainers in Vocational Education and Training (VET), especially for the design and the application of computer based trainings (CBT; E-Learning) and simulation based trainings (SBT).

Although these competencies are essential for trainers in all domains, there are differences in the competence levels of trainers and instructional designers. For trainers in professional driving there is a base level characterized by the functions of an E-Tutor and a trainer specialized in Simulation Based Training. Other levels and professional functions of trainers need the competencies to design complete courses and curricula as well as to design or at least to support the design and development of computer based learning environments. Section 2 refers very shortly the theoretical background the definition of competencies is derived from and section 3 represents a list of the competencies with short descriptions and specifications.

In section 4 we propose a base syllabus especially for trainers in VET for professional driving on the eTutor/Simulation Trainer level. Section 5 contains a draft for two pilot courses.

2 Background of the definition of competencies

Base of the paper are the standards published by the International Board of Standards for Training, Performance and Instruction (IBSTPI) since 1978 on the one hand (Richey, Fields, & Foxon, 2001) and the specification of the skills for designing, developing and delivering multimedia learning products by Niegemann et al. (2008) on the other hand. Both sources are committed to evidence based results of research in instructional psychology and educational technology.

Figure 1 represents a graphical overview over the relevant domains of competence.

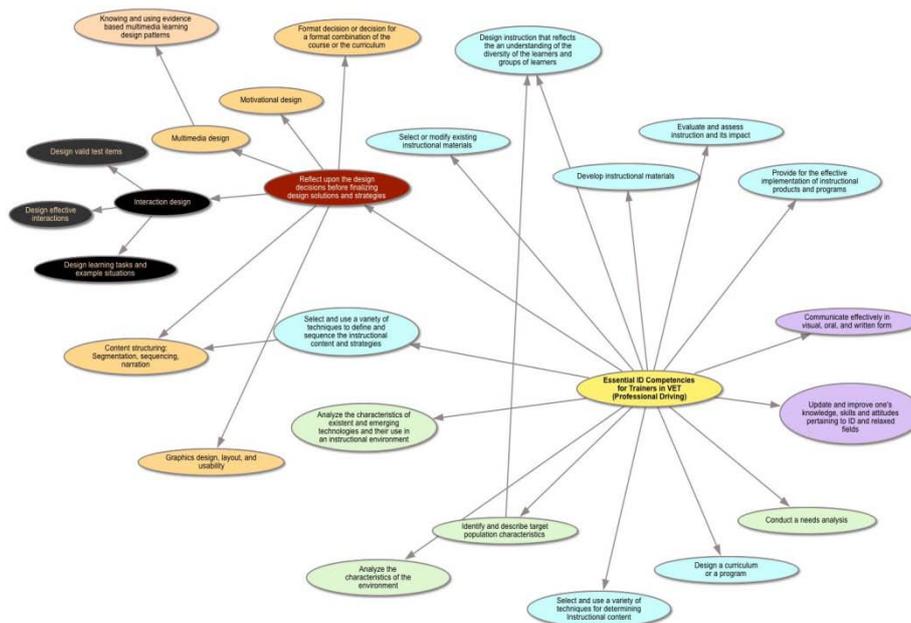


Figure 1: Conceptual map of essential ID competencies

Figure 2 shows the framework model “Decision Oriented Instructional Design” model that offers an overview over the fields of decision, which must be considered in any instructional design project.

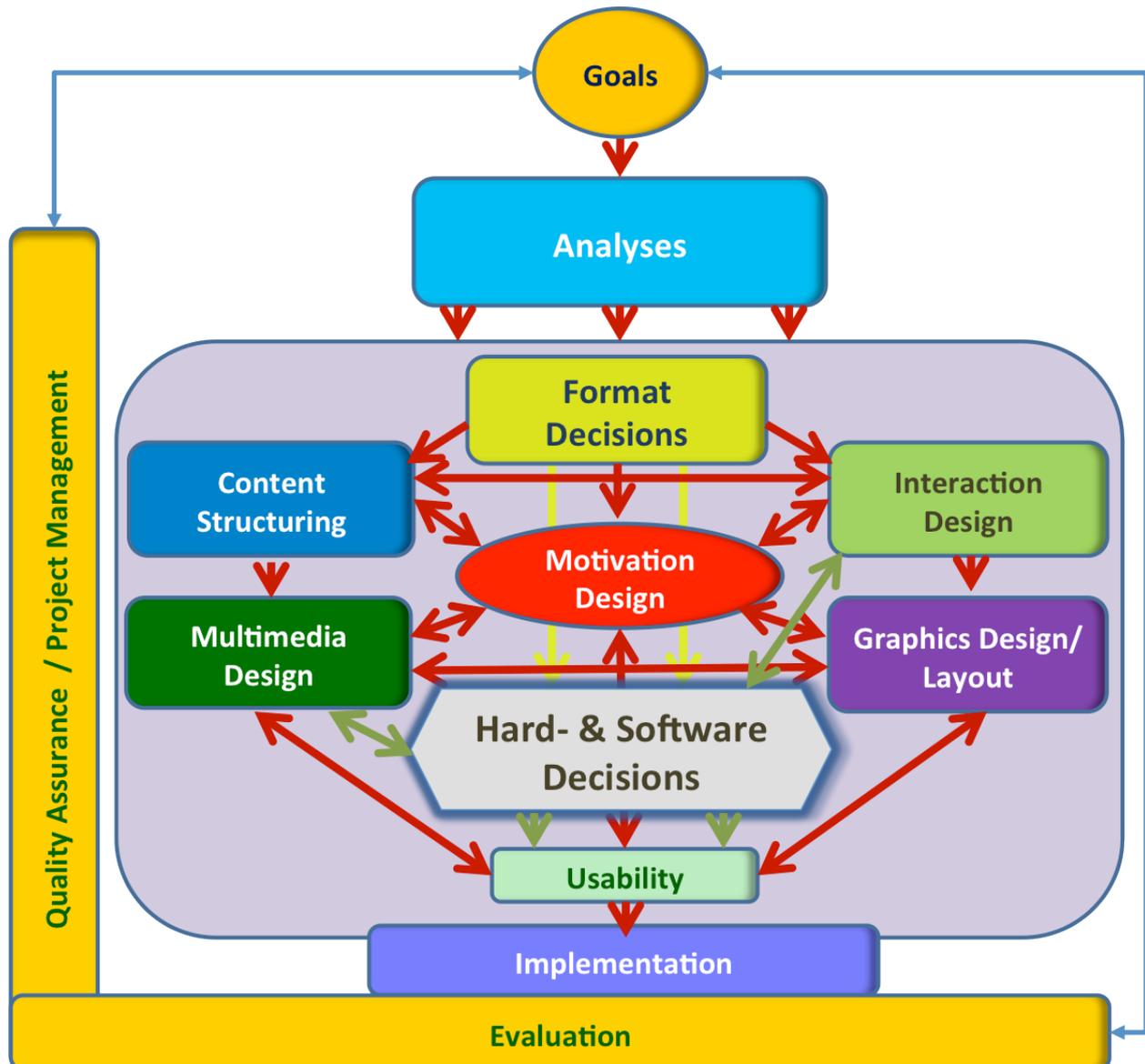


Figure 2: Decision Oriented Instructional Design Model (DO ID Model) (based on Niegemann et al. 2008)

The Decision Oriented Instructional Design Model (DO ID Model) is a framework model, not a concurrent model to established ID models and theories (Tennyson et al. 1997; Reigeluth 1983, 1999). In some sense it is a further development and specification of the well known very general ADDIE model: Analysis – Design – Development – Implementation – Evaluation (Gustafson & Branch 1997).

Another indispensable source is Klauer’s “General Teaching Algorithm” (GTA) (Klauer 1985), which describes the essential teaching functions for any kind of instruction, be it teacher driven classroom teaching, self regulated learning with media or e-learning in any form.

3 Compilation of Competencies for Trainers in Professional Driving

3.1 Communicate effectively in visual, oral, and written form

- a) Create messages that accommodate learner needs and characteristics, content, and objectives.
- b) Write and edit text to produce messages that are clear, concise, and grammatically correct.
- c) Apply principles of message design to page layout and screen design.
- d) Create or select visuals that instruct, orient, or motivate.
- e) Deliver presentations that effectively engage and communicate.
- f) Use active listening skills in all situations.
- g) Present and receive information in a manner that is appropriate for the norms and tasks of the group or team.
- h) Seek and share information and ideas among individuals with diverse backgrounds and roles.
- i) Facilitate meetings effectively.

3.2 Update and improve one's knowledge, skills and attitudes pertaining to ID and related fields

- a) Acquire and apply new technology skills to instructional design practice.
- b) Participate in professional activities.
- c) Establish and maintain contacts with other professionals.

3.3 Knowing the necessity of needs analyses

- a) Understanding the results of needs analyses referring to the instruction to be delivered
- b) Identifying the discrepancies between current and desired performance

3.4 Knowing the basics of the design of curricula or programs

- a) Determine the scope of the curriculum or program and decide whether it is suitable for a specific learner group
- b) Specify courses based upon needs assessment outcomes
- c) Sequence courses for learners and groups of learners
- d) Analyze and modify existing curricula or programs to insure adequate content coverage.

3.5 Select and use a variety of techniques for determining instructional content

- a) Identify content requirements in accordance with needs assessment findings.
- b) Determine prerequisites given the type of subject matter, the needs of the learners and the organization.
- c) Use appropriate techniques to analyze varying types of content.

3.6 Identify and describe target population characteristics

Determine characteristics of the target population influencing learning and transfer. Analyze

the characteristics of the environment

3.7 Analyze the characteristics of the environment

Identify aspects of the physical and social environments that impact the delivery of instruction.

3.8 Analyze the characteristics of existent and emerging technologies and their use in an instructional environment

- a) Specify the capabilities of existing and emerging technologies to enhance motivation, visualization, interaction, simulation, and individualization.
- b) Evaluate the capacity of a given infrastructure to support selected technologies.
- c) Assess the benefits of existing and emerging technologies.

3.9 Select and use a variety of techniques to define and sequence the instructional content and strategies

- a) Use appropriate techniques to identify the conditions that determine the scope of the instructional content.
- b) Use appropriate techniques to specify and sequence instructional goals and objectives.
- c) Select appropriate media and delivery systems.
- d) Analyze the learning outcomes and select appropriate strategies.
- e) Analyze the instructional context and select appropriate strategies.
- f) Select appropriate participation and motivational strategies.
- g) Select and sequence assessment techniques.
- h) Prepare a design document and circulate for review and approval.

3.10 Structuring the content: Segmentation, sequencing, narration

- a) Determine the appropriate strategy to divide the subject matter into small units and use it properly
- b) Find the appropriate method of sequencing the content and apply it
- c) If the format decision is game based learning find or construct an appropriate story to embed the subject matter intrinsically

3.11 Reflect upon the instructional design decisions of a given program or product before using it

Be critical towards instructional materials to be used and remain open to alternative solutions

3.11.1 Format decision or decision for a format combination of the course or the curriculum

- a) Knowing different formats and their characteristics
- b) Being able to decide for a suitable format or a combination of formats taking into account instructional pros and cons as well as economic aspects

3.11.2 Motivational design

- a) Knowing and applying the basic needs (autonomy, competence, relatedness)
- b) Knowing and appropriate applying the ARCS model for motivation design

3.11.3 Multimedia design: Knowing and using evidence based multimedia learning design patterns

- a) Knowing and using the basic theoretical background of multimedia learning effects:
- b) Knowing and using the multimedia principle in multimedia learning
- c) Knowing and using the split-attention principle in multimedia learning
- d) Knowing and using the modality principle in multimedia learning
- e) Knowing and using the redundancy principle in multimedia learning
- f) Knowing and using the personalization principle in multimedia learning
- g) Knowing and using the worked examples principle in multimedia learning

3.11.4 Interaction design

- a) Knowing the psychological foundations of efficient interaction design
- b) Designing interaction opportunities for learning
- c) Knowing specific forms of interaction in CBT
- d) Evaluate an e-learning product concerning the appropriateness of the interactivity

3.11.5 Design learning tasks and example situations

- a) Knowing different formats of learning tasks and when they are appropriate for a given content (learning objectives) and specific groups of learners (learner characteristics)
- b) Knowing techniques to derive learning tasks from the description of the subject matter and the instructional objective(s)
- c) Designing valid learning tasks which represent the learning objectives
- d) Estimate the difficulty of a learning tasks for each specific group of learners
- e) Identify the set of learning tasks representing a competency adequately
- f) Simulation Based Training: Select an appropriate course of learning tasks/example situations for a learner with specific characteristics (kind of failures in former training units, demands for the learner's practice)

3.11.6 Designing valid test items

- a) Knowing the basic principles of measurement and testing (criteria of goodness: objectivity, reliability, validity; basic ideas of the measurement of human attributes; principles of competency based measurement)
- b) Designing appropriate test items and examination questions for teaching objectives in a specific (sub-)domain

3.11.7 Graphics design, layout, and usability

- a) Knowing basic principles of graphics design and layout and being able to discuss them with graphic designers

- b) Knowing the value of the usability of learning software and important principles of software usability
- c) Knowing the necessity of usability testing and its basic methods

3.12 Select or modify existing instructional materials

- a) Identify existing instructional materials for reuse or modification consistent with instructional specifications
- b) Select materials to support the training or instructional process
- c) Work with subject matter experts to validate material selection or modification
- d) Integrate existing instructional materials into the design

3.13 Select or develop instructional materials

- a) Select or develop materials that support the training or the instructional process
- b) Discuss and/or work with subject matter experts during the development process
- c) Select instructional materials in a variety of delivery formats regarding the given conditions of learning

3.14 Select or design instructional/training units that reflect the an understanding of the diversity of the learners and groups of learners

- a) Select or design instructional units that accommodate relevant learner characteristics
- b) Be sensitive to the cultural impact of instructional materials
- c) Accommodate cultural factors that may influence learning

3.15 Evaluate and assess instruction and its impact

- a) Knowing the criteria for reliable and valid test items
- b) Knowing a variety of formats and when their use is appropriate
- c) Identify the processes and outcomes to be measured given the identified problem and proposed solutions
- d) Knowing the concept of formative evaluation plans
- e) Knowing the concept of summative evaluation plans
- f) Identify and evaluate the sources of evaluation data

3.16 Provide for the effective implementation of instructional products and programs

- a) Use evaluation data as a guide for revision of products and programs
- b) Recommend updates for instructional products and programs
- c) Monitor and revise the instructional delivery process as required
- d) Recommend the revision of instructional products and programs when observing learners' difficulties
- e) Recommend the revision of instructional products and programs to reflect changes in the organization or the target population

4 A Basic Syllabus for eTutors and Trainers for Computer and Simulation Based Training

4.1 Modul 1: Foundations of human learning (adult learning) and thinking

- Basic concepts: Learning, teaching/instruction, motivation, emotions, memory and recall, understanding/comprehension, thinking, transfer of learning, problem solving, errors and
- Metaphors of learning and kinds of learning: Learning as response strengthening, learning as the acquisition of knowledge, learning as knowledge construction.
- Motives, motivation and getting motivated
- Emotions and learning
- Multimedia learning
- Learning outcomes

4.2 Modul 2: Foundations of instruction in VET

- The teaching functions and the General Teaching Algorithm
- Instructional objectives: defining objectives
- Using concept mapping as a method to structure content
- Ways of motivating learners (and to avoid de-motivating)
- Delivering information: Basic formats of teaching in VET (especially for professional drivers)
- Assure understanding (facilitating learning by scaffolding, asking questions, fostering learner questions, answer to learner questions)
- Basic rules of communication as a trainer and learning facilitator
- Multimedia learning: Principles for the design of instruction
- Interactions – why they are important to foster learning (if they are designed well)
- Assure subject matter is stored into the memory and can be retrieved if needed
- Assure transfer of learning
- Organizing instruction and training processes

4.3 Modul 3: Basics of training skills

- Using information concerning the learning prerequisites of learners
- Structuring the content (information, tasks, sample situations)
- Planning an instructional or training session (teaching goal given): segmentation, sequence, pacing
- Put a training session in effect (focus on: motivating the learner, inform, assure understanding, assure retention and)
- Giving feedback appropriately
- Design valid test items to assess the learning success

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