

# The Concept and Methodology of Competence Design for Disciplines and

# **Areas of Study**

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**Abstract:** The present article refers to the foundation of a model of designing general competences for discipline taking into account psychological, pedagogical and teleological aspects.

The model focuses on psychological theories of learning, teleological structuring of education finalities, formative potential of discipline content, but also on the modern definition of competences to be formed. The article also describes in detail the steps and procedures of designing general competences for disciplines and areas of study, applying the proposed model.

**Key words:** definition of competences, general competences, transversal competences, specific competences, competencies taxonomy, psicho-pedagogical model, discipline

# **1. Introduction**

Essential political, economic, and cultural changes have caused numerous effects in the educational system, which required a new way of thinking and organization of the educational activity. In this respect the competence-centered approach appears as a challenge and a post-modern tendency.

It is worth mentioning that certain ideas of the competence-centered approach in education have emerged as a result of the labour market assessment as well as the requirements to the modern specialists. These requirements encompass team-work abilities, independent decision-taking, acceptance and promotion of innovations, stress-situations management, etc.

The pupils' competences that might be necessary to succeed in a constantly dynamic modern society cannot be exclusively formed by means of school disciplines. The reassessment of the relations and interconnections between disciplines can be achieved in the context of a modern management of the teleological model.

In an survey carried out within the area of the member states of the OECD (The Organization for Economic Cooperation and Development), a series of major tendencies have been identified and they eventually led to the teleological re-conceptualization of educational finalities: the stress laid on high abilities and cross-curricular skills/competencies: the integration of the courses/disciplines; the integration of the disciplines/courses; the implementation of interactive technologies in the educational process, learning through cooperation and investigation, performance evaluation, the increase of students', teachers' and managers' responsibility. In the

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context of theses tendencies, the teleological approach to competencies is nothing else than the expected/projected educational finalities.

The definition of the concept of "competence" resides on two aspects: psychological and pedagogical. Out of the multitudes of definitions of the notion we have highlighted the most relevant ones, in our own esteem:

(1) "the optimal correlation between the individual abilities and the results of his activity" (Salade D., 1997);

(2) "the ability to transform decisions into actions, to do something good, just, useful" (Mureşan V., 1997);

(3) "the ability to solve a problem properly and to take proper decisions, to fulfill an assignment or to practice a profession in good conditions and with acknowledged good results" (Jinga I., 1989);

(4) "the abilities that are applied in various situations, according to the ascribed rules (assumed for the rational and successful accomplishment of tasks and problems) (Neacşu I., 1990);

(5) "a category of individual characteristics closely-connected with the acquired knowledge and values;" (a valid operational aptitude) (Singer M., 2003);

(6) M. Singer defines the competences as structured sets of knowledge and skills acquired through learning; these allow for the multi-contextual identification and solution of problems characteristic of a certain domain(Singer M., 2003).

In the scientific literature there are some other definitions: an ability that provides for the successful accomplishment in carrying out a task (CSME-Confederation sindicalemondiale des enseignants, 1985); a set of knowledge and abilities ("savoir-faire") that affords an adequate achieving of a task or a set of tasks (CMTE-Commissionministerielle de terminologie de l'education, 1992); an ability acquired through pertinent knowledge acquisition and experience which consist of the circumscription and solution of specific problems (Dictionnaireactuel de l'education, 1993).

The competence, in our vision, could be defined as a set "of abilities to act in undetermined situations". The simplest and most acceptable definition could be formulated as follows: "an integration of knowledge, abilities and attitudes". Viewed psychologically, a competence presents a state of psychic potentiality of a person to adequately and efficiently act, or a system of actional and operational characteristics that together with the knowledge, abilities and necessary experience will lead to efficient and performance actions (Polya G., 1971).

Therefore, the competence represents an integral characterization of the person. In this respect it can be regarded as:

(1) The integration of knowledge, abilities and attitudes, as well as a means of carrying out the cognitive, social, professional activity (psychological view);

(2) A personal quality or trait socially and economically conditioned, which is formed and maintained in the society (socio-psychological view);

(3) An objective and a finality of education (pedagogic/teleologic approach).

Taking into account all these we suggest the following classification of competences:

(1) The psychological approach: competences (meta-competences) formed during school disciplines teaching as well as during extra-curricular activities; the competences formed within the disciplines (general and specific); the competences formed during the learning of complex units of content (specific).

(2) The pedagogical approach: key-competences, transversal (cross) competencies; subject-specific competences (general); competences specific for a learning unit (intermediate/constitutive);

(3) Teleological approach: the general objectives oriented to training specific skills while studying disciplines; reference objectives oriented to training specific competences within a unit of learning; operational objectives

oriented to training the operational dimensions of competences.

### 2. Concept and Methodology

There are several theoretical and praxiological models of designing general and specific competences. The background and the development of a model of this type is directly related to the learning theories. In this sense the theory of mental actions, founded by P. Galperin, P. Sanet and J. Piaget can be exploited in order to build the model of competence design.

The theory resides on two approaches: The first deals with the stages of mental actions, argued by P. Galperin:

Stage I – internalization of actions (the phase of constituting the orientation base of the action); it determines the necessity of projecting the competence of reception and internalization;

*Stage II* – an embodied action directed towards the structure of the learning goal under teacher's guidance; it determines the competence of primary processing of information and algorithmization;

Stage III - externalization through language; it determines the competence of expression, utterance;

Stage IV – internalized language' the capacity to solve a system of operational tasks with given notional-verbal determines the category of secondary information processing competences, etc.;

Stage V – "a flow of verbal images of things, processes, words"; it determines the competence of secondary processing of information, results and, to a lesser degree, the integration competence.

The second approach deals with another concept of structuring the mental operations: perception, primary internalization, mental structures construction, transposition into language, internal accommodation, external adjustment. It is specifically this approach founded by M. Singer (Singer M., 2003) that set the background for the theoretical model of general (specific) competences projection for disciplines.

The model under consideration is presented as follows:

**Reception** can be materialized through the following operational concepts: identification of terms and processes, observation of certain phenomena, processes, perception certain relations, connections; nominalization of certain concepts, relations, processes; data collection from various sources; definition of certain concepts.

**Primary Data Processing**can be materialized through the following operational concepts: data comparison; establishment of certain relations, calculation of partial results; data classification; representation of certain data; data sorting, data discrimination; investigation, exploration; experimentation.

Algorithmization can be materialized through the following operational concepts: Reducing to a scheme or model; anticipation of results; data representation; noting some invariants; problem solving and algorithmic modeling.

**Expression**can be materialized through the following operational concepts: description of states, systems, processes, phenomena; generating ideas, concepts, solutions; argument of utterances; demonstration.

**Secondary processing** (of results) can be materialized through the following operational concepts: comparison of results, output data, conclusions; calculation, evaluation of results; interpretation of results; analysis of situations; developing strategies; networking between different types of representations, between representation and object.

**Transfer** can be expressed through these operational concepts: application; generalization and customization; integration; checking; optimization; transposition; negotiation of complex connections; adaptation to context and

adequacy.

This model can be developed and adapted to different concepts of learning and curriculum projects. In this regard two perspectives are clearly identified:

(1) ensuring coherence with transversal skills, primarily when they are part of disciplinary curricula;

(2) providing "a continuous trunk" of the categories of competences, as well as the diversity and the possibility of expansion and concretization through different operational concepts.

The content of the competence must encompass the discrimination/operation potential related to the learning context, in vice versa, the complexity of learning operations should be found in the content and category of competence. The content of the competence can be related to various learning theories, i.e.:

(1) Multiple Intelligence Theory having as a mechanism of translation of the reality in psychic process, in its intellectual structure the following stages: rudimentary modeling, internalization of a specific symbolic system, representing in a specific notional system, expression in a register of social and professional roles;

(2) Constructivist Theory, which lays the emphasis on construction of knowledge by the individual's intimate resources: initiative, activism, his experience.

(3) Gestalt Theory, which focuses on: completeness of perception, spontaneous organization of "the experience-field", solution discovery etc..

(4) Mental Actions Theory which is carried out in stages, and was launched by P. Galperin (see above).

Thus, every learning theory determines the content of its competences by means of its very concept. In the structuring of the categories of competences we could apply various combinations and interconnections of the learning theories. In other words, the model suggested by M. Singer makes an attempt at generalizing several approaches referring to learning as well as the structuralization/classification of learning objectives (the teleologic dimension). The model being both theoretical and praxilogic, successfully combines in itself the conceptual and the experiential dimensions.

The categories of general and specific competences within the analyzed model are viewed pedagogically and teleologically; they represent the "input" of the system and could be viewed as achievable objectives.

The successiveness of input competences as well as the sequence of the mental operations that determine the content and the category of the latter are not of hierarchical nature, but rather temporal. Each competence or combination of competences can play dominant roles in relation to cross-competences, key-competences or learning contexts. Similarly, mental operations or combinations of these can have dominant roles in the formation of certain competences/categories of competences.

For the authors of curricula and teaching staff the following argument is most relevant: the categories of competences (reception, primary data processing, algorithmization, expression, secondary processing integration and transfer) constitute landmarks and a finality at discipline as well as learning unit level. Each category of general competences for a certain discipline is gradually formed through operationalizing at the learning unit level. The typology of operations/operational concepts (learning unit specific competences) is determined by: the category of the competences, the content of the learning unit; the stages of competence formation; the level of competence formation (its complexity); its correlation with cross-curricular competences.

Thus, the model of projecting the competences ensures a framework for general competences projection through their correlation with the categories from the model and for "learning unit specific competences" through their correlation with operational concepts/categories of operational concepts/taxonomies of operational concepts. The logic and the proceeding of projecting competences for the disciplines are as follows:

Step 1: The model/referential for projecting the discipline is studied.

Step 2: The content and the formative valences of the disciplines are analyzed.

*Step 3:* The cross-competences are analyzed and their derivatives referring to designing general competences for the certain discipline are established.

*Step 4:* Each category of competences is formulated according to the respective category in the model related to the discipline.

*Step 5:* Alternatives/variants for each category of competences are formulated applying the operational concepts referential.

Step 6: Expert discussion of general competences characteristic of the discipline and the most appropriate variant is approved.

Step 7: The consecutiveness of the learning unit contents is identified.

Step 8: Specific learning unit competences are formulated through specifying general competences at the learning unit level and operationalization based on the competence referential (competence taxonomy) and the formative potential of the learning unit.

*Stept 9:* There occurs the establishment of the subcategories/ dominant operational concepts, repeatable for each learning unit (specific learning unit competences) in terms of a systemic accomplishment of specific competences taxonomy.

*Stept 10:* There occurs the accomplishment of the "operationalization" of competences specific for a learning unit(the design of the lesson); on the level of teaching tasks(we apply the concept of double operationalization), general competences, specific competences, operational objective competences.



Figure 1 References on Designing Specific Competences for the Discipline.

	fable 1	Competence	of Knowledge and	Comprehension
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Nr.	Categories of specific discipline competencies (general)	Specific competences for thelearning unit/operationalconcepts
1	Competence of perception and internalization	•Identification of concepts, phenomena, processes,
	•perceiving and understanding of oral and written texts of	relationships, etc.
	various types (language and literature)	•definition of notions
	• perceiving oral or written transmitted messages in	•observation of phenomena
	different speech situations (language and literature)	•enumeration of facts, phenomena, processes
	• identifying correctly the mathematical data and	•reproduction of definitions, texts etc.,
	interpreting them depending on the context in which they	•data/information collection,

were defined (mathematics)	<ul> <li>description of facts, phenomena, processes</li> </ul>
•defining and recognizing the specific concepts of physics	•highlighting facts, phenomena, processes.
(physics)	
•coherent perception of the elements, processes and	
phenomena that define the geographical environment	
(geography)	
•individual perceiving of the artistic messages from the	
visual universe (arts)	

Nr.	Categories of discipline specific competences	Specific competences for thelearning unit /
111.	(general)	operationalconcepts
2	Primaryprocessing of data /information,	•AnalysisandSynthesis;
	observationscompetence	<ul> <li>comparisonanddiscrimination;</li> </ul>
	Examples:	• relationship establishment;
	• Usingcorrectandproperlanguage in	categorizationandclassification;
	differentassessmentsituations	• inductive, deductive methods;
	(languageandliterature).	• investigation;
	• processingquantitative, qualitative, structural,	• exploring;
	contextual data contained in mathematicalutterances	• experimentation;
	(mathematics).	• solving simple examples.
	• Choosing optimal algorithmsthatallow data processing	
	(mathematics).	
	• guidedxplorationandexperimentation of	
	Explanation on discussion of	
	• Explorationandinvestigation of	
	(abamistra)	
	Decomposing a problem integrithershipmend date	
	•Decomposing a problem intosubproblemsand data	
3	Modelingandalgorithmiccompetence	• Building schemesandmodels:
5	Examples.	• Applyingdiagrams models algorithms:
	• Usingstylisticanalysistools for differentliteraryand	• problem solving and algorithmic modeling.
	non-literarytexts (languageandliterature)	• anticipation of results
	• Usingalgorithms for solvingpractical problems (math.	• data representation:
	chemistry, physics).	• structuring
	• Solvingproblems of theoreticalandappliednature	
	(physics, chemistry, etc.).	
	• modelingbiologicalphenomenaandprocesses in orderto	
	prove sometheories (biology).	
	•	
	Modelingandimplementingthetechnologicalinformation	
	in graphicsthroughconventionalsymbols	
	(technicaldrawing)	
4	Expressionand argument competence	<ul> <li>Description of processes, phenomena, systems;</li> </ul>
	Examples:	• generatingideas, concepts, solutions,
	• written or oral argumentation of theissuesandopinions	• argument of utterances;
	on a literary or nonliterary text (languageandliterature).	• demonstration;
	• Producingwritten or oral	• interpretation;
	messagesappropriatetogivencontexts	• illustration;
	(languageandiiterature).	• narration.
	• Expressingeritalisituationsinfougnmathematical data	
	Explaining the physical physic	
	• Explaining inephysical phenomena in a specific modeling language and abstraction (physica)	
	• Explaining the changes involved in chamical reactions	
	(chemistry)	
	Describingsomeelements     processes	
	henomenathatformthegeographicalenvironment	
	(geography)	
5	Secondaryprocessing of theresults data	• Concluding
5	becomany processing of theresuits, data	Concruting

# Table 2 The Competence of Application

#### Effectiveness Analysis of College Students' Ideological and Political Education in the Period of Horizon Transition

andobservationscompetence	• evaluation of results,
Examples:	• systemicanalysis of data, phenomena, processes;
• Makinginteractions in oral or writtencommunication	developingstrategies;
(languageandliterature).	• relatingbetweendifferenttypes of representations;
• Analysing a problematic	• producingnewideas;
situationandestablishingthenecessaryassumptions for	• extrapolation;
itssolution (mathematics).	• expanding;
• Analysing problematic situations in ordertofind out	• abstraction;
apropriate strategies for theirsolution (mathematics,	• appreciation
physics, etc.).	
• Relating real phenomenawiththeirgraphic,	
cartographicrepresentation	
(geography).	

Nr	Categories of discipline specific competencies	Specific competencies for thelearning
141.	(general)	unit/operationalconcepts
6	Integrationcompetence	•Generalizationandcustomization,
	Examples:	• optimization;
	• Identifying specific elements of cultureandcivilization	• transposition;
	of a nationand their integration in a multicultural context	• transfer;
	(languageandliterature).	<ul> <li>adaptationandadjustmentcontexts;</li> </ul>
	• Transferringandmediating oral or writtenmessages in	• planning;
	variouscommunicationcases (languageandliterature).	• management,
	• Mathematicalmodeling of situations-problem for	<ul> <li>Individual and group research;</li> </ul>
	differentfieldsknowledgeintegration (mathematics).	<ul> <li>conceptualization;</li> </ul>
	• Accomplishingtransfers , knowledgeintegrationand	<ul> <li>case studiessolving, problem situations;</li> </ul>
	specific physicalworkingmethods in ordertoapplythem	<ul> <li>decision-making;</li> </ul>
	in natural scienceandtechnology (physics).	• effectivecommunication.
	Transferingandapplyingbiologyknowledge in	
	variouscontexts (biology).	
	• Designingapplications to solve problems using specific	
	tools for data processing (computer science, physics,	
	etc.).	
	• Elaboratingprojects on environmentprotection	
	(ecology).	

#### Table 3 Integrationand Transfer Competences

## 3. Discussion and Conclusion

Therefore, the general competencies are guidelines that indicate the characteristics and acquisitions of a student at the end of a study year or a course, but the specific competencies which are designed as concrete finalities represent the proof that this student has competencies that were previously designed.

Because the training/development of competencies in students runs in a integrated — linear, cyclical and/or concentric way, the authors of curricula will take in to account this fact, but also will consider the correlation of competencies both vertically and horizontally (see Scheme 2 and Scheme 3).

In the process of determiningthecorrelationbetweengeneral competencies of the discipline and the specific competencies for the learning unit through a series of combinations, it is necessary to identify the dominant general competence to be formed within the study of one or more learning units and, respectively, to identify the specific competences for the learning unit that are constituient and dominant in the process of general competence formation.

Thus, the general competence for the discipline No. 1 canbe dominant for the 2, 4, 5... learningunits. In thissituation, within the study of the learning unit No. 2, could be considered as dominant the specific competences of differentiation, comparison, algorithmization... as descriptors of the dominant general competence (N1), and within the study of the learning unit No.4 could be considered as dominant the specific competences of



identification, analysis, generalization, etc. as descriptors of the same dominant general competence (N1).

Figure 2 Vertical Correlation of Competences

CT - transversal competences; CD - competences for disciplinesandareas of study.



Figure 3 Correlation of the General Competenceswithcompetencies for Thelearning Unit CD – competences for disciplines; CU – competences for thelearning unit.

At the same time, the dominant specific competence of a general competence, could be complementary to another general competence or toother general competences. In this regard, it is important that within the study of the learning units, the number and consistency of dominant specific competences that are attributed to a dominant general competence must provide the formation of the dominant general competence.

There with, it is necessary to combine the specific competences of the learning unit so that they could include the whole spectrum of necessary descriptors in the process of general competences formation during the study of all learning units that are specific to a discipline. In other words, if the general competence is characterized by descriptors, such as: differentiation, classification, comparison etc., then these descriptors must take the form of specific competence that will be formed during the study of one or more units of content.

It should be noted that from the perspective of action/activity the general competence for a discipline and the specific competence for the learning unit could have the same formula — as an active verb. But, the area of action in the first case, refers to discipline entirely, and in the second case the action relates only to the context of the learning unit which is part of the discipline structure. For example, the competence of classification of the objects, phenomena, processes in the domain of the education sciences could be considered as a general competence, but if

the area of action is changed, for example, the classification of objectives, phenomena and processes regarding the learning theories, this competence could be considered as a specific one.

Certainly the learning approach focused on competences is developing constantly. It is found, also, the development of connections and interconnections between different types of competences. There may exist several variants/matrix of vertical structuring combinations of competences that are determinedby:

- The requirements of labor market;
- The changes in the contexts where the competences are manifested;
- The potential of the courses/academic disciplines;
- The cycle and the general program of studies, etc.

At the same time, it is real and appropriate to develop a core-matrix of combination and interconnection of different types of competences.

The horizontally correlation represents a theoretical and methodological approach based on establishing interconnection between competences/finalities — contents-teaching strategies — assessment strategies and achieving a reverse connection.

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