

USING THE QUALITY FUNCTION DEPLOYMENT METHODOLOGY FOR EFFECTIVE PLANNING OF TEACHING AND LEARNING PROCESSES

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Abstract: *This paper offers a reflection about the use of Quality Function Deployment (QFD) applied to a university course of accounting. The aim is to classify the most effective teaching methods (teaching strategies) with respect to specific relations: targets (stakeholders' needs)/needs (students' needs). In particular, learning outcomes (LO) are expressed in terms of homogeneity or heterogeneity in learning (at the beginning, underway and outbound) that a class of students shows with respect to the initial target/needs of an accounting course. The study has been carried out through the observation of the learning outcomes of different class of students, in three consecutive years of an accounting course, carried out by the same teacher. The results of the experimentation have demonstrated that specific target/needs are associated, over time, to the same teaching strategies. The continuous process carried out by the teacher about the course design (with the QFD), the managing of education in class, the evaluation/self-evaluation of the educational processes carried out and of the improving/standardization (with the QFD) of the teaching strategies with respect to the initial target/needs of the course, has allowed a classification of the most effective teaching strategies with respect to the evolution over time of the relations target/needs (self-training of the teacher).*

Keywords: *QFD, Quality Function Deployment, Higher Education, Teaching Methods, Teaching Quality, Learning Outcomes, Accounting, House of Quality.*

1. INTRODUCTION

The Quality Function Deployment has been applied in different way in higher education. This paper refers to those studies which have used the QFD in order to translate the students' needs in "technical specifications" (most effective teaching strategies) useful to the satisfaction of those needs (e.g. Lam & Zhao, 1998; Chou, 2004; Ictenbas & Erylmaz, 2011).

The aim of this article is the use of QFD in order to standardize the teaching strategies in an accounting course in a correlated and dynamic manner. The relation and the dynamic aspects are an answer to the complexity of teaching and, with respect to the analysed literature, represent an unexplored aspect that this paper seeks to deepen. In this sense, this approach has been experimented in an accounting course carried out from the same teacher with different classes during three consecutive years.

The results of the experimentation have demonstrated that specific target/needs are associated, over time, to the same teaching strategies. The continuous process carried out by the teacher about the course design, the managing of education in class, the evaluation/self-evaluation of the educational processes carried out and of the improving/standardization of the teaching strat-

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egies with respect to the initial target/needs of the course, has allowed a classification of the most effective teaching strategies with respect to the evolution over time of the relations target/needs and the self-training of the teacher.

In particular, this paper seeks to verify the possibility to extend the use of the QFD in various moment of education (initial, underway and final) in order to classify the most effective strategies with respect to the specific target/needs relations in an accounting course.

The QFD presented during this work are suitable to provide to an accounting teacher the information about the existing relationship between the targets of the course (according to a specific classification) and the related needs that a class of students can present with respect to each one of them (homogeneity/heterogeneity in the learning) and the most effective strategies useful to satisfy those target/needs.

In particular, the QFD has been used for the design of an accounting course composed of classes with a considerable number of students (an average of 200 students per class). The use of QFD at the beginning, underway and at the end of each one of the years of experimentation have allowed to analyze the LO of different classes of students.

The analysis allowed to analyse the LO of the class of students with respect to different initial target/needs in terms of the variations from a homogeneity state top-bottom (low level of knowledge of the students) or heterogeneity in the learning, to a homogeneity bottom-up, depending of the different strategies adopted by the teacher. In this sense, the most effective strategies, useful to transform a low target/need (homogeneity top-bottom of heterogeneity) in a high one (homogeneity bottom-up), have been standardized.

Starting from the evidence of the literature on the study of the QFD in higher education, the aim of this paper is to demonstrate the opportunity to use the QFD in order to satisfy the needs of all the customers (stakeholder, teachers and students) in a correlated way over time. The QFD has never been used in order to fill, in a dynamic way, the educational gap of the students and teachers with respect to the expectation of the stakeholders. In this sense, the paper shows the results of the experimentation of QFD for the design and the standardization of target/needs and teaching strategies in the three years of experimentation in an accounting course.

This work is structured in three parts. The analysis of the literature anticipates the description of the methodological approach used in this experimentation. In the following part the results of the research are discussed. Finally, reflections for future research development are considered.

2. LITERATURE REVIEW

Higher education is dramatically changing. The past universities' environment, in which education and teaching was considered as detached services with respect to the overall markets, have been replaced by an always more competitive framework (Quinn, Lemay, Larsen, & Johnson, 2009; Sagnak, Ada, Kazancoglu, & Tayaksi, 2017), in which higher education has to be considered as a real product (Sangeeta, Banwet, & Karunes, 2004; Tsinidou, Gerogiannis, & Fitsilis, 2010). In this new climate, quality of teaching, learning, courses, faculties, and universities is becoming a central issue.

The focus on customer (student) satisfaction, the necessity of continuous improvement of services and programs and the new awareness of higher education to be part of a smart environment, allow the increasing of interests in quality evaluation (Jaraiedi & Ritz, 1994). The consciousness of higher education institutes to provide services to a greater number of stakeholders, often hard to classify and recognize, allows to reconsider the role of students, teachers, staff, and stakeholders in the process of quality evaluation.

QFD is an instruments of quality evaluation developed by Mizuno and Yogi Akao in the 1960s and then successfully applied in industry and services, thanks to its ability to take into consideration every stakeholder of a product (Sahney, Banwet, & Karunes, 2006).

2.1. QFD in higher education

In the literature, a part of the papers has investigated the use of QFD in order to reach a better comprehension about the possibility to obtain a substantial improvement of quality in higher education in specific contexts (Giilser & Alpay, 1998; Sagnak, Ada, Kazancoglu, & Tayaksi, 2017).

Several papers have been written in order to promote QFD as a useful methodology to design, redesign, or improve university's curricula (e.g. Donald S., 1995; Stampen & Hansen, 1999; Liu, Lee, Lin, & Tseng, 2013).

Despite listening the voice of customers and its correlation between best practices, in order to translate them into a higher quality course program, is one of the fundamental applications of QFD (Tsinidou, Gerogiannis, & Fitsilis, 2010), this method is not only linked to this aim. In fact, QFD has been also used to reach a specific level of quality in order to obtain institutional accreditation (e.g. Bier & Cornesky, 2001). Moreover, it has been suggested that the usefulness of QFD approach to quality evaluation for higher education institution could be considered also for its efficiency, because of its capability to reduce the complexities of managing processes (Motwani, Kumar, & Zubair, 2008).

2.2. QFD, higher education, and teaching methods

The methodology of QFD have been used in order to translate the students' needs into the most effective best-practice (teaching methods) suitable to guarantee an always better level of quality in higher education (e.g. Lam & Zhao, 1998). This use of QFD has been carried out in several fields as nursing (Chou, 2004), engineering (Ogot & Okudan, 2007; Mukaddes A., Bagum, Anisul, & Mohammad Muhshin, 2012), management (Ezzell, Cudney, Phelps & Mazur, 2016; Backru, 2018).

Since that attention for the achieving of a high level of quality standards depends on the listening of students' voice, these articles experimented different methods in order to involve students into the process of identification of quality requirements: focus group and brainstorming (Chou, 2004), surveys with open questions and comparison with the literature (Ogot & Okudan, 2007), and close surveys (Ezzell, Cudney, Phelps & Mazur, 2016; Backru, 2018).

In some cases, the focus of the articles was on the skills that have to be owned by students in order to reach a level of employability as higher as possible. In these cases, the field involved in the analysis were industrial engineering (Ictenbas & Erylmaz, 2011) and financial accounting

(Raissi, 2018). In these cases, the methods used to listen to the voice of customers were composed by questionnaire administrated to students, graduated students and employers (Raissi, 2018), or the analysis of job advertisements (Ictenbas, 2011).

In these articles, the identification of the teaching strategies in order to complete the HOW section of the House of Quality in the QFD have been carried out through different methods: focus group composed by students (Chou, 2004), in-depth literature analysis (Ogot & Okudan, 2007; Ezzell, Cudney, Phelps & Mazur, 2016), and the contemporary use of literature review and interviews with the students (Backru, 2018). In the cases of articles focused on the external customers, the teaching strategies have been defined directly by the teachers of analysed courses (Ictenbas & Erylmaz, 2011), or by a QFD team composed by the head of two departments and the director of the institute (Raissi, 2018).

In order to complete the QFD matrix with the correlation between the stakeholders' needs and teaching strategies a considerable number of methods have been used. In some cases, the students have been involved in this process with questionnaires (Chou, 2004) and with focus groups (Ezzell, Cudney, Phelps & Mazur, 2016). In other cases, the correlations have been decided by the teacher of the course (Backru, 2018; Ictenbas & Erylmaz, 2011; Raissi, 2018).

The implementation of the QFD method provides for a discussion about the frequency of the assessment. It has been recommended with different solution, e.g. at the beginning of the course with periodic checkpoints (Ezzell, Cudney, Phelps & Mazur, 2016), on a regular time basis (Ogot & Okudan, 2007).

3. THE COMPLEXITIES OF TEACHING AND THE ROLE OF QFD

Classifying the most effective teaching strategies in a specific context (e.g. disciplinary, academic, social, etc.) implies the consideration about the complexities of teaching (Casey, Gentile, & Bigger, 1997). In particular, teaching is achieved over time and in a context that is relational, disciplinary, social, etc.

Considering the relational aspect means to recognize that the satisfaction of students' needs come to fruition through the satisfaction of stakeholders and teachers' needs, in a related way.

Considering the time dimension means to recognize that such relations are continuously changing and that everything is influenced from the disciplinary, social and cultural reference framework (Verna, 2017; Verna, Antonucci, Sargiacomo, & Venditti, 2019).

Referring to the relational aspect, listening to the stakeholders' needs (implemented in a continuous time at the level of course of study) and the translation of these needs into targets (of the course of study and single teaching courses) allow to identify the relative students' needs, in terms of the gap between the stakeholders' expected learning outcomes (target) and those actually reached by the students.

With respect to this context of target/needs, or with respect to (potential) gap of educational needs which have to be satisfied, teachers' training needs have to be listened. In this case too, the needs are listened in relation to those of the students, i.e. the stakeholders. In particular, the educational needs of teachers are listened in terms of gaps between the knowledge/competence

owned by teachers about the most effective teaching strategies for the achievement of specific target/needs and what is indeed needed to satisfy this relation.

Listening and satisfaction of all the needs is carried out during the time in which teaching is achieved. In this sense, the evaluation of the satisfaction level of students' class needs, with respect to the targets (learning outcomes – LO), at the beginning, underway and outbound, and that of the teachers (evaluation/self-evaluation) with respect to those LO, allows the teachers to standardize the more effective teaching strategies that are suitable for the achievement of specific target/needs.

Therefore, the use of QFD during three consecutive years has allowed the production of a classification of the more effective teaching strategies with respect to every type of target/needs related to an accounting university course. In this sense, with respect to each category, the target/needs relations linked to the three years accounting course have been standardized.

In the following paragraphs, this article deepens the research methodology used in order to reach these goals and describes the reached results.

4. THE QFD AND THE DESIGN OF AN ACCOUNTING COURSE: TARGETS, NEEDS AND TEACHING STRATEGIES

In this empirical application, QFD has been used in order to design the accounting course in each one of the years. Figure 1 (QFD1) represents the design of the first year. In particular, the QFD1 create a relation, on the one hand, with the target of the modules of the course and the related students' needs (Figure 1, first and second column), and on the other hand, with the teaching strategies (higher row).

The targets of the course have been defined by the teacher in relation to general targets indicated by the Teaching Commission (institutional organ of the course of study to which the accounting course is related) and classified on the basis of the Dublin descriptors³ and classified as “basic” and “advanced”.

Table 1. Description of teaching strategies (Verna, 2014)

Strategies	Methods	Description
Strategy 1	Class / tutorial (explain, demonstrate, perform)	<i>The Strategy 1</i> is the classical method of conducting a lesson. As shown in Table No.1, this strategy provides an initial introduction of the topic to be addressed (articulated in explanation and practical demonstration) followed by a tutorial (which in the course of accounting often results in a financial accounting survey) carried out by students themselves. At the end of each educational intervention regardless of the strategy adopted it is always envisaged a brief summary, but important (reinforcement) of the argument presented. This type of strategy is particularly effective with respect to learning objectives related to both the knowledge of concepts and procedures and the ability to use them in “operational expertise”. 1 The strategy is also presented as a slow, analytical and facilitative progression of topics, particularly suited to a classroom of students neophytes “non-experts”.

³ Qualifications Frameworks in the European Higher Education Area (QF-EHEA), Bologna Process, National Qualification Frameworks, 2005.

Strategy 2	Role playing / tutorial / class (demonstration - stimulus, perform, discuss, explain)	<i>The strategy 2.</i> In this case, the lesson is presented with a role playing (Capranico, 1997; Bushing, 2004), which introduces (stage presentation) the information necessary to carry out the next tutorial. The information can also be introduced without role playing. Role playing is not used in the traditional way “learning by doing, imitating, etc.” But it is used to draw the attention and motivation of the learner in addition to ability to find / select the relevant information independently. At the end of the exercise the teacher discusses with students the results achieved by them, summarizing and synthesizing the issues dealt with the lesson. The time devoted to discussion and understanding in this case is greater. Although the objectives reached with this strategy are the same as previously seen, the strategy 2 (inductive) is more suitable for students who already have (or have reached) certain knowledge and skills.
Strategy 3	Case / class (perform, discuss, explain)	<i>The strategy 3</i> combine the two classical methods: lecture and case. The case is particularly suitable for the learning of intellectual skills (problem solving), the lesson is imperative to clarify doubts, gaps and discuss the issues raised in the case, and then reinforce learning. The main advantages for students lie the practical application of their knowledge, a high involvement and a greater learning and “memory” of what executed. The third strategy involves the use of closed cases in which there is a right answer (or two or three) in order to prove the “technical process” to be used for a certain type of problem. In the course of accounting used as a reference, given the high number of students, the case is carried out by students individually or at most in pairs. Compared to this strategy it counts as already observed for the previous year (strategy 2) as is in terms of the objectives and the type of students to whom it is addressed.
Strategy 4	Project work / class (perform, discuss, explain)	<i>The strategy 4</i> is particularly useful when the course is at an advanced stage or the professor have a classroom particularly trained. The strategy 4 offers the advantages of the active methods (discussed above) and allows the learner to develop, strengthen and expand the ability to use concepts and techniques already acquired (Baldassarre, 2003) in addition to the advantages offered by the interactions in a group work. In this case too, objectives and students to whom it is mainly addressed are the same as in the previous strategy.
Strategy 5	Class / self-study / questionnaire (or closed case) (demonstration, perform, discuss, explain)	<i>The strategy 5</i> consists of a brief introduction of the teacher on the outline of the subject of the lesson (15/20 minutes) followed by a moment of self-study on synthetic and clear hand-outs allowing the student to learn and reinforce what the teacher introduced and to test their learning in the following questionnaire. Self-study in the course of accounting has been used for a time not exceeding 30 minutes. The remaining time was used to carry out the questionnaire (20 minutes) and the discussion in the classroom. The strategy 5 is particularly effective for knowledge objectives and students’ classes with less expertise and especially facilitates the learning of complex issues as it allows to deal with the same topic with different approaches: listening, study, self-evaluation and comparison.
Strategy 6	Class / questionnaire / class (or closed case) (explain, perform, discuss, summarize)	<i>The strategy 6</i> is a classical one, particularly effective for the transmission and examination of knowledge and overfill any gaps identified. Even in this case students not particularly experienced are the favourite recipients of this teaching strategy equally effective even for “classes more experienced.”
Strategy 7	In-class hands-on activities	<i>The strategy 7</i> is a learning by doing method. It consists of task simulations, problem-solving exercises. Specifically, in this experimentation, the teacher used it as practice simulation of accounting entries of invoices, credit notes, etc. Finally, a plenary discussion of the results is planned.

The students’ needs (third column) are expressed in terms of homogeneity (bottom-up or top-down) or heterogeneity, referred to the level of knowledge possessed by the class of students at the beginning with respect to the course targets, the first year of experimentation (Verna, 2014;

Verna, Perozzi, 2014). The learning outcomes (LO) are expressed in terms of homogeneity and heterogeneity in the learning shown by the class of students with respect to the targets of the course at the end of each module, for each year of experimentation.

The evaluation of the needs and the LO is made through objective tests⁴. Every item has a weight that has been translated into a 0-10 scale, and it has allowed to individuate the entry needs and the LO (underway and outbounds) of students' class with respect to every target (0 was null, 10 was the maximum). The QFD1 shows the needs related to the entry test of first year of this empirical experimentation.

The teacher's needs have not been directly represented in the QFD of this paper, but indirectly through the standardization of teaching strategies that has been realized by the teacher of the first year of experimentation. The teacher's needs have been listened through a qualitative test, based on the teaching strategies (Table 2), administered to the teacher for self-evaluation and to the students, together with the learning evaluation test (at the end of the first module, at the end of an intermediate module, and at the end of the last module for each one of the years of empirical test).

Targets			Needs	Strategy 1	Strategy 6	Strategy 5	Strategy 2	Strategy 3	Strategy 4
K&C	Basic	A	8	+					
		B	9	+					
	Advanced	C	9	-	-	-			
		D	9	-	-	x			
Applied K&C	Basic	E	9	+	-	-			
	Advanced	F	10	+	-	x			
Judgment Autonomy	Basic	G	10	+	-	x			
	Advanced	H	10	+			+	-	-
			Homogeneity top-down						
			Weights of educational strat.	334	141	83	50	30	30

Sign	Value	Kind of relationship
+	5	Strong
-	3	Average
x	1	Weak

General accounting	A	Recognize the logic of functioning of financial and economic accounts
	B	Recognize the different nature, object and functioning of account items
National accounting principles	C	Recognize the principles that guide the formation of balance sheet
Capital / Income	D	Recognize the component of income from that of capital
Accounting recognition of the main management operations	E	Accounting recognition of the main management operations
Balance sheet	F	Draw up the balance sheet
Balance sheet	G	Carried out the linkages between the management operations recognized in double-entry system and the balance sheet items
	H	Evaluate the results of the balance sheet

Figure 1. QFD1

The teaching strategies (Table 1) have been identified referring to the empirical study carried out during five years of accounting course (Verna & Perozzi, 2014). The aim is the extension of the research, carried out in the previous years (Verna, 2014), to the time and relation dimensions that characterize the complexity of teaching. In this sense, the teaching strategies defined in the

⁴ The test administered to the students are composed by multiple-choice questions, close cased, exercise with one or more known solutions.

QFD1, have been experimented by the teacher in each one of the three years of the course and they have been standardized depending on their effectiveness in satisfying the target/needs.

Specifically, the correlation shown in the QFD1 matrix between target/needs and teaching strategies is established by the teacher in relation to the initial needs of the class of students (entry tests). In this case, those needs have highlighted a homogeneity of the class towards lower values (high needs). The teacher sets up the correlation inside the matrix depending on the legend shown below. Multiplying the value associated to the symbol (+,-,x) times the needs, the results is the value of the strength or weakness of the correlation between the strategies and the target/needs. The results shown by the QFD identify the Strategy 1 as the more suitable teaching method with respect to that specific class. Strategies 6 and 5 are respectively the second and the third most effective strategy with respect to the relation target/needs in this first phase of course beginning. During the accounting course and at the end of the course, the teacher has to verify if the relation that has been established in the matrix is correct, depending on the LO of the students during the time.

In the following paragraphs, the details of the empirical test of QFD in the three years of an accounting course are presented, offering an analysis of the reached results for each one of the years.

5. THE QFD AND THE STANDARDIZATION OF TEACHING STRATEGIES IN AN ACCOUNTING COURSE

At the end of the first year of the course the teacher standardizes the most effective teaching strategies useful to satisfy the initial target/needs relations (first and second column of QFD1). For this aim, the teacher uses the QFD2, in which the teaching strategies are presented in a different order with respect to the initial project. The strategies respect the hierarchical order linked to the LO that the strategy has allowed to reach to the class of students, at the end of the first year of this empirical experimentation. Specifically, QFD2 highlights the initial target/needs relation (first and second column), placing side by side a third column related LO of ending of the course. The lower is the LO related to each target/need, the higher is the ability of the strategy, adopted by the teacher, to satisfy such relation.

For example, the strategy 1 allowed the teacher to specifically satisfy the specific relation related to target/need: “K&C – Basic – General accounting (identify ...) / 8” and that of general satisfaction of the target/needs relations of the accounting course (350, that is about the 95% of the maximum possible result given the needs – 370). In this sense, the correlation in the matrix has been carried out by the teacher depending of the self-training process that the same teacher has done during the course, monitoring the time and relational dimension of teaching. With respect to such dimensions, the teacher has evaluated his/her ability to reduce the gap between LO and target/needs of the course, through the continuous process of designing (QFD), managing of class teaching, evaluation of the results (evaluation tests about LO and about the appreciation of students, self-evaluation of the teacher) and improving – corrective actions experimented by the teacher during the accounting course. In particular, at the end of each module, the teacher has administered one evaluation test of learning. After that, the teacher has evaluated the reached results and, in case of negative outcome, has filled out the self-evaluation test.

The comparison between the self-evaluation carried out by the teacher and the appreciation test made by the students (administered them at the end of the first module, at the end of an inter-

mediate module and at the end of the last module) has allowed the teacher to identify potential problems (e.g. managing the strategy, unsuitableness of the strategy with respect to the target/needs, etc.), and to experiment the corrective actions in the following modules (new teaching strategy, better competence in managing the strategy, etc.).

So, the comparison between the two evaluations allows the teacher to identify his/her training gap (related to the teaching strategies), or the training needed by the teacher, suitable to identify the corrective actions that satisfy the target/needs relation. Specifically, with respect to the targets related to the acquisition of knowledge (basic and advanced K&C) and the related needs, the strategies experimented by the teacher have been those which have been defined in the QFD1. The LO presented near to zero scores already during the tests carried out at the end of the first and the second module.

Table 2. Teaching strategies – Evaluation/self-evaluation questionnaire⁵

ID	Self-evaluation made by the teacher	Evaluation made by the students
1	Do I adopt effective teaching methods?	Does the teacher adopt effective teaching methods?
2	Do I introduce a new method (teaching strategy) showing clearly the rules and the aims?	Does the teacher introduce a new method (teaching strategy) showing clearly the rules and the aims?
3	Do I propose different typologies of teaching strategies (class, laboratory, simulations, etc.) related to the target/needs?	Does the teacher propose different typologies of teaching strategies (class, laboratory, simulations, etc.) related to the target/needs?
4	Do I adopt different strategies in order to alternate the individual work with that of the group, related to the target/needs?	Does the teacher adopt different strategies in order to alternate the individual work with that of the group, related to the target/needs?
5	Do I adequate teaching instruments to the class needs?	Does the teacher adequate teaching instruments to the class needs?
6	Do I always define time of the lesson in order to leave time for questions, reflections and conclusions?	Does the teacher always define time of the lesson in order to leave time for questions, reflections and conclusions?
7	Do I respect the timing of the lesson (beginning, end)?	Does the teacher respect the timing of the lesson (beginning, end)?
8	Do I use effective instruments during the lessons of the module, useful to clarify, simplify and facilitate the learning?	Does the teacher use effective instruments during the lessons of the module, useful to clarify, simplify and facilitate the learning?
9	Do I verify the presence and the functioning of the instruments in the class before the lessons?	Does the teacher verify the presence and the functioning of the instruments in the class before the lessons?
10	Are the teaching material that I give to the students (practice exercises and lesson notes) clear and useful to the satisfaction of the relation target/needs?	Are the teaching material that the teacher gives to the students (practice exercises and lesson notes) clear and useful to the satisfaction of the relation target/needs?

With respect to the target/need “K&C – Basic - Recognize the nature, object and functioning ... / 9” the teacher has adopted the strategy 1 in order to introduce the theoretical concepts and demonstrate the application ways these concepts.

⁵ This questionnaire is a brief part of a wider questionnaire, related to a innovative holistic approach (L'Ascolto ®) used to reach the continuous improving of teaching and learning processes, undergoing testing in an Italian university.

With respect to the target/needs “K&C – Advanced - Recognize the principle ... / 9” the teacher continued with the utilization of Strategy 1 in order to introduce new topics, to demonstrate them through guided practice exercises and to analyse them plenary. Instead, the teacher has used the Strategy 5, 6 and 7, alternate them in order to support the learning.

The addition of the new Strategy 7 is the result of a corrective action carried out by the teacher with respect to the targets of “Applied K&C”. The positive results (LO), derived from the experimentation of such Strategy 7, lead the teacher to use it for the target “K&C – Basic” and “K&C – Advanced”.

The strategy 7, with respect to the target “K&C – Basic” and “K&C –Advanced” has been applied only in order to support the topics with increasing level of practice exercise.

In the QFD2 the LO show how the target/needs relation about basic and advanced K&C has been almost totally satisfied by the strategies 1, 7, 6 and 5. These results have been confirmed from the appreciation tests carried out by the students (continuous process of evaluation/self-evaluation).

Referring to the target of “Applied K&C – Basic” and “Applied K&C –Advanced”, the LO have been initially unsatisfying, showing high values, only little decreasing, in the first and second final module test.

With respect to such (basic and advanced) target/needs relations, the teacher had adopted the strategies presented in the QFD1. Strategy1 was adopted in order to introduce the topics, carry out demonstrations and guided exercises, and the Strategy 6 was adopted in order to support the learning. In this case, the evaluation/self-evaluation process allowed the teacher to observe a negative judgement with respect to the strategy 6, a clear discrepancy with the teacher’s self-evaluation. In particular, the students given a score of 1 (absolutely not) to the question 1 “adopt effective teaching methods, or useful teaching methods for class comprehension” and a score of 1 to the question 4 “the teacher adapt teaching methods and instruments to the class needs”

With respect to the same items, during the self-evaluation the teacher had expressed positive evaluations, considering the teaching strategy suitable to satisfy the target/needs relation. The following comparison, carried out by the teacher with the class of students, has allowed the teacher to reach a better comprehension about the emerged problems during the utilization of such strategies and to define and carry out the corrective actions for the next modules. In particular, the effectiveness of this strategy was impeded by the target/needs relations: “Applied K&C” with high educational needs. The strategy 6, mainly based on the autonomous work made by the students (questionnaire), instead of clarify and support what have been already treated by the teacher, created more doubts that the students were not able to communicate to the teacher without create confusion and delate in the timing of the lesson. The technical aspect related to the accounting topics, and the specific target “Applied K&C”, together with the high educational needs, was in stark contrast with such type of teaching strategy (Table 2). For examples, the Strategy 7, mainly based on practice exercises, is more suitable for the development of such competencies.

In the following modules (third and fourth), the teacher applied the Strategy 1 (in the manner seen before) and has indeed introduce the Strategy 7 in order to support the knowledge/competences gradually acquired by the students. The LO of the students have been satisfying already at the end of the third module, highlighting a clear improving in the final course test (Figure 2).

Targets			Needs	Learning Outcomes	Strategy 1	Strategy 7	Strategy 6	Strategy 5	Strategy 3	Strategy 2	Strategy 4
K&C	Basic	A	8	0	+	-	x	x		x	
		B	9	1	+	-	x				
	Advanced	C	9	2	+	+	+	+		x	
		D	9	2	+	+	+	+			
Applied K&C	Basic	E	9	2	+	+					
	Advanced	F	10	3	+	+					
Judgment Autonomy	Basic	G	10	2	+	+			+		
	Advanced	H	10	5	-	-	x	x	+	x	x
			Homogeneity top-down	Homogeneity bottom-up	350	316	117	108	100	27	10
			Weights of educational strategies								

Figure 2. QFD2

Referring to the target/needs “Independence of judgment - Basic and Advanced”, these have been treated by the teacher with the different strategies presented in the QFD1. In particular, the basic target/needs “Carry out the links between management operation .../10”, have been treated gradually by the teacher from the first to the last module of the course, using the Strategy 1. The presentation of each new accounting registration has been associated with the related positioning of the balance sheet entry. The support of the same concepts and the in-depth analysis have been faced with the Strategy 6. The results in terms of LO, in the first and in the second module have been the same as seen before, with the same negative evaluations both in the appreciation tests and in the direct comparison with the class of students.

In this case too, the adoption of the Strategy 7 has allowed the satisfaction of the target/needs relations in the following modules. In particular, practice and structured exercises have allowed the teacher to support, at the same time, the target/needs related to the accounting entries, them positioning in the balance sheet and the identification of the links between these aspects.

Referring to the target/need “Judgment Autonomy - Evaluation of the balance sheet results / 10”, the LO have been different. Specifically, the balance sheet evaluations often represent the final aspect of the accounting course program (basic) in a bachelor degree program, in which such topics are deepen in a following accounting course (advanced). Such targets have been faced in the third and fourth module of the course. In this case, the available time for the improving corrective action carried out by the teacher has been less the before. In particular, the test results of the third module have highlighted LO with identical values with respect to the needs (10). In order to satisfy those target/needs, the teacher experimented the teaching strategies detected as the most effective in the QFD1 (i.e. 1,2,3 and 4).

The comparison between the evaluation/self-evaluation tests allowed the teacher to highlight some critical aspects. In this case the question number 1 and 4 in the appreciation test completed by the students, highlighted a respective score of 1 and 2. From the comparison with the students, the teacher verified that, despite they enjoyed the Strategy 2 as they found it interesting and stimulating for the listening of the lesson (Role playing/tutorial/class), they did not have the opportunity to experiment directly their ability to evaluate and interpret the balance sheet.

With respect to the managing of the Strategy 4, the students allege confusion in the class, delay in the execution time and absence of time for the conclusions. The students appreciate instead the Strategy 3, despite it has been used only once by the teacher.

The corrective actions, identified by the teacher, concerned the experimentation of the Strategy 3, proposing to the students some increasing difficult case studies. The LO related to the last

module of the course have highlighted an improving and a high appreciation of the students in the appreciation test, also if the available time did not allow to consider further improvements for this year of experimentation.

6. THE QFD AND THE TEACHING STRATEGIES IN AN ACCOUNTING COURSE, BETWEEN INNOVATION AND STANDARDIZATION.

In the following years, the classed of students have shown the same homogeneity of needs (top-down). So, the teacher has confirmed the most effective strategies of the previous year, with respect to each category of target/needs.

The only variations were related to “Applied K&C – Basic” and “Applied K&C – Advanced”, in which Strategies 2 and 3 have been experimented with more frequency. The teacher, during the previous year, had verified (evaluation/self-evaluation process) the appreciation of the students with respect to these strategies.

In particular, the Strategy 2 (role playing / tutorial / class) have been considered useful to the listening motivation. Thus, the teacher decided to experiment Strategy 2 in order to introduce case studies or to summarize and support the acquisition of specific competencies. The positive results of this experimentation are shown in the Figure 3.

Referring to the Strategy 3, the success of such strategy for the target “Judgment Autonomy”, bring the teacher to experiment this Strategy in order to verify the opportunity so satisfy the relation target/needs “Applied K&C – Advanced”. The teacher used this strategy as a support for “Applied K&C – Basic” and “Applied K&C – Advanced” and as a motivation for the students because it creates an alternative to the use of Strategy 7 and a different way to face the same topic.

Targets			Needs	Learning Outcomes	Strategy 1	Strategy 7	Strategy 3	Strategy 6	Strategy 5	Strategy 2	Strategy 4
K&C	Basic	A	8	0	+	-		x	x	-	
		B	9	1	+	-		x			
	Advanced	C	9	2	+	+		+	+	-	
		D	9	2	+	+		+	+		
Applied K&C	Basic	E	9	2	+	+	x				
	Advanced	F	10	3	+	+	-				
Judgment Autonomy	Basic	G	10	2	+	+	+				
	Advanced	H	10	5	-	-	+	x	x	x	x
			Homogeneity top-down	Homogeneity bottom-up	350	316	139	117	108	61	10
Weights of educational strategies											

Figure 3. QFD3

During the final year of experimentation, the teacher has confirmed the same teaching strategies used in the previous year. The needs shown by the class of students (the same of the previous year) have confirmed, with respect to the same targets, the effectiveness of the same strategies.

The content of the QFD completed at the end of the third year of experimentation was exactly congruent with the QFD3.

7. CONCLUSION

This paper tries to detect how specific target/needs relations, in a specific context (accounting), need a constant listening, related to the needs emerging from the underway educational processes (evaluation tests, appreciation tests and self-evaluation tests). Therefore, the strategy does not represent, per se, the solution for an excellent learning, but the continuous and correlated consideration of the emerging needs from the referring context (disciplinary, social, cultural, etc.). The ability to monitoring and interpret the complexity of teaching, through plural and multidimensional approaches, which have to take into account the numerousness of the involved variables, the relations between these variables and their variability over time, conduct to a process of efficient teaching and learning (evaluation and self-evaluation of students and teachers).

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