ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 03, pp.2642-2654, March, 2019

DOI: https://doi.org/10.24941/ijcr.34393.03.2019

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

UNDERGRADUATE TEACHERS AND THE CURRENT TRAINING POLICY IN CÔTE D'IVOIRE: CHALLENGES AND PERSPECTIVES

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ARTICLE INFO

Article History:
Received 04th December, 2018
Received in revised form
10th January, 2019
Accepted 07th February, 2019
Published online 31st March, 2019

Key Words:
Bivalent Teacher, Professional Knowledge, Training Policy,
Secondary Education, Undergraduate.

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ABSTRACT

Considered as a social tool designed to fulfill the needs of this society, teacher training aims at allowing individuals to be equipped with teaching competences. This paper puts to examine the new Ivorian teachers training policy with a specific focus on junior high physics-chimestry/biology teachers training at the teachers training college of Abidjan. The latter recruited among students and teachers at the level of License 2 in the subjects taught at the college, join the Ecole Normale Supérieure (ENS) of Abidjan for a training of three semesters of theoretical courses and a semester of practice in secondary schools. . They come out with the title of bivalent profile high school teachers. The present study intends to contribute to evaluate not only the quality of this training policy, especially the professional performances of bivalent high school teachers. To achieve this goal, we applied two methodological approaches. The first is qualitative and based on documents analysis. The second is qualitative and. It was based on classroom observations. The results show a good integration educationnal sciences in the training policy of the latter and a weak vocational training in the second subject associated with the basic subject of the bivalent teacher. This study argues accordingly for a reinforcement of these dimensions in the pre-service and in-service training of the bivalent high school teacher for a better performance in classrooms.

***Citation*: *Dr NGUESSAN Kouamé, O.* 2019.** "Undergraduate teachers and the current training policy in Côte d'Ivoire: Challenges and perspectives", *International Journal of Current Research*, 11, (03), 2642-2654.

INTRODUCTION

Designed as a social tool, teachers training is intended to provide to individuals skills, conceptual knowledge, problem-solving skills (Jagmohan, 2000). Since independence high school teachers training in Côte d'Ivoire faces the same concern. Indeed, it has not really found an appropriate response to succeed teachers intellectual, didactic and professionnal training. The various reforms (Vila, 2009) were based on the need for training that ensures both high scientific level, pedagogical and didactic qualities, but based on the evolution of subjects. Despite these a number of reforms, most students are deeply confused. It is more than urgent to overcome the shortcomings both in terms of teacher training policy and at every levels of high schools. Thus, faced with the strong demand of rural households in the first cycle: students population increased from 1.2 million in 2015 to 2.1 million in 2025. Accordingly, there is a rising need to adapt its offer to rural areas and especially to girls, only 2% of whom can hope to complete high school. Government has welcomed the findings of the State of the National Education System Report (RESEN, 2015). It orders the construction of equipped neighborhood high schools and the training of bivalent high school teachers to overcome the deficit of teachers in certain sectors,. It also suggested the devaluation of many subjects and to solve the problems of replacement of the latter. The new teacher training policy for secondary education consists of training the same teacher in two different subjects. This training of bivalent high school teachers according to the Emergency Project of Support to Basic Education (PUAEB, 2013) should not only improve access, retention and completion in the first cycle but also and above all the equity of the Ivorian education system and performance through the availability of teachers in the institutions. Thus, Government orders the recruitment by competition of students and teachers of bac + 2 level. These must be trained at the Ecole Normale Supérieure (ENS) of Abidjan for three semesters with lectures and a semester of practice in public high schools. With these trained teachers and community high schools built in rural areas, students will be able to live with their families to attend school; especially girls will benefit from more effective parenting, thereby reducing the risk of early pregnancy and sexually transmitted diseases for girls as stipulated by the Emergency Support Project for Basic Education (PUAEB, 2013) . The purpose of this work is to measure the professionnal performances ef of these teachers from the new policy of training bivalent teachers. It is more precise to measure the mastery of these two subjects by bivalent teachers.

The paper as follows. After presenting the philosophy of bivalence and the historical evolution of the notion of bivalence, the research mentions the methodology adopted followed by the description of the results and their discussion.

Theoretical frame

Philosophy of bivalence: With Rettig (1998) we ask the following question: "Bivalence, what for? ". This seemingly banal question is, however, the one posed by any teacher in training at the teachers training college Abidjan who will enter the profession and accompany him throughout his career as a bivalent teacher. Although bivalence is a notion with relatively vague contours, little mentioned in the programs or in official speeches, although university research especially in the field of didacticss are almost non-existent until a very recent period, today this training is a reality at the teachers training college of Abidjan. The recent evolutions rises the question of the crossing of the two logics that crosses the bivalence: vertical logic of the disciplines and horizontal logic at the crossroads of the disciplines. As stated by Morin (1990), a subject is *"an organizational category within scientific knowledge"*; it is organized according to laws which are specific to it and which provide it with a degree of autonomy while being part of a much broader field of knowledge. The bivalence in this case would allow to go beyond a disciplinary compartmentalization which, in the teaching, could help the pupils to apprehend knowledge in a more global way. Bivalence is thus the teaching of two subject of different specialties by the same teacher, for which the latter would have received a double training.

In Côte d'Ivoire, the review of actions and experiences in the field shows that bivalence goes beyond the concomitance of two lessons, and it highlights a coordination of content to be taught and transfers of pedagogical practices, even a whole methodology. In the conception of bivalence, the first step is to enable teachers to make their own transfers of knowledge and know-how acquired in the simultaneous learning of the different subjects they must teach. . We therefore have a two-way teaching / learning based on the approximation and interaction of the different disciplines. In a second step, it is a question of helping the future professors of profile bivalent in formation to grasp the operation of the various disciplines in order to facilitate their comprehension and their acquisition.

Historical overview of the concept of bivalence: Following the question "Bivalence, what to do", we complete it with this other question: Why does the current training of high school bivalent teachers in Côte d'Ivoire? This questioning then encourages us to look back to the past and to rethink bivalence in a historical perspective, in connection with the very history of high school education. Bivalence in general education is modeled on that resulting from vocational training; She herself was born of two different realities: the manual schools of learning on the one hand and the professional teachings on the other. After 1945, programs emphasize the need for intellectual training on the one hand; and the role of general disciplines as adjuncts to professional disciplines. Thus, French, history and geography, calculus and the sciences of observation constitute the intellectual formation. This raises the question of what Terral (2009) calls the "third education" at the crossroads of primary and secondary education and which, because of its versatility and its globalizing purpose, could weigh against the teaching of professional disciplines.

To meet this need, a national competition for the recruitment of bivalent teachers was set up in 1949, permanently establishing the bivalence in vocational education, despite its growing integration into the overall education system. The fact that the same teacher teaches French, history and geography, labor legislation, civics and morality seems to be able to respond to the desire to give students a global culture, open to the life and that allows them not only to dominate the profession, to understand the world but also to enroll in a process of social promotion. The relationship between the two teachings was not a major concern at the time since the programs distinguish as non structuring principle the disciplines as in the secondary but the literary teachings versus the scientific teachings. This distribution of different knowledge according to the period also questions the widespread idea of the essentialist nature of the disciplines and tends to show the momentary aspect of the disciplinary configurations. The bivalent teacher is then above all a teacher at the service of the profession and the bivalence is of interest only if it fits in this perspective. From 1970 to 2009, it occured a new configuration of bivalence. This period is marked by the redesign of programs: the emphasis is on the one hand on the notion of skills and on the other hand on the importance of an open general education on life. In a context of modernization of disciplines, bivalence is thought around an attempt to create what Lelièvre (2013) describes as neo-discipline: knowledge of the contemporary world for example for the disciplines of history and geography.

Bivalence, rather than asking for a reflection on how to articulate knowledge and disciplinary know-how, leads to diluting disciplines. It is therefore on the side of skills that the bivalence will be able to be built: read a text, make a synthesis, put in report text and image ... The bivalence or the fact to teach two subjects is one of the tracks retained in France to reform teaching profession. In 1989 in France, "The system of bivalent association of subject, specific to high schools, exists in almost all the countries of the European community.In fact, it exists (history-geography-civic education, physics-chemistry ...) in high schools courses that brings together in a single institution the so-called long track framed by certified and aggregates, the so-called 'short track' supervised by bivalents teachers" (PEGC), and a pathway called "transition-practice" supervised by specialized teachers.

Bivalence in French-speaking Africa: In French-speaking countries (West Africa), bivalence is designed accordind to French model. But the reforms undertaken have remained timid because the weight of the inheritance remains higher than that of the needs. The recruitment of bivalent teachers forces them to learn in action that is still not easy to achieve: the lack of essential knowledge to set up demanding programs, and mastering didactics specific to each subject requires ongoing endeavour. This makes pupils lose their school marks. Bivalence is in line with transdisciplinary approaches and project pedagogies: by establishing bridges between two subjects, for example Physics-Chemistry and biology. This approach to subject as a "coherent whole" faces cross-curricular competencies confronted with pedagogical approaches that affect several subject, leading to academic problems and loss of school benchmarks for many students (Rettig, 1998). The latter are baffled because they regularly express the need to know for example in the case of the French block, History aa-Geography "if they sudy French or geography" (Courbon, 1998).

In Côte d'Ivoire: In the 1980s, students with a bachelor's degree were directly referred to teachers training college. After two years of theoretical training and one year of practical training, they leave with the certificate of educational aptitude for general education colleges (CAP / CEG). They are then assigned to the institutions where they practice in one of the dominant disciplines of the obtained bachelor's degree series. Thus, from 1980 to 2013, these teachers worked as monovalent teachers in the subject studied at university. This brief overview of the history of the bivalence in vocational adn general education shows how obvious it seems to be to the point that the very status of bivalent teachers should federate an alchemy that neither the prescriptions nor the manuals seem to have really reflected. At the didactic level, in the case of Physics-Chemistry block and biology the presence of experimental approaches in Physics-Chemistry or vice versa is not sufficient to construct specific objects.

Teachers professional knowledge: It is the summ of essential knowledges used by the teacher in his teaching. Then, it should be taken into account the activity of the latter in teacher-learner interactivity where certain types of knowledge are built during this interactivity. In our study, this model proposed by Shulman (1986, 1987) and modified by Grossman (1990) and Magnusson et al. (1999) is valuable in reconstructing the knowledge at play in the teacher's practice. It makes it possible to distinguish the knowledge that is at the teacher level, the knowledge it mobilizes in relation to a content to be taught, knowledge at the student level which is the specific knowledge to the teaching of this content. Pedagogical Content Knowledge (PCK) expresses the combination of content and pedagogy. The Grossman (1990) study defines the four broad areas of teacher knowledge that are: general pedagogical knowledge (PK), subject knowledge (SMK), subject-related instructional knowledge (PCK), and background knowledge (KofC). But this work of reconstruction of knowledge from the action of the teacher in the classroom is difficult because, according to Vergnaud (1996), it is the operating form of knowledge used in action. Thus, Magnusson et al. (1999) defines a PCK model with five components:

- Awarness on the teaching perspective of the subject: they refer to the knowledge of the teachers (aims and objectives to teach the subject at a level of study);
- Awarness on the subject programs : they concern the knowledge of the goals and objectives (national expectations) and the specific knowledge of the program and the teaching materials;
- Awarness on evaluation: what to evaluate and how to evaluate it;
- Awarness on teaching strategies: they include specific strategies for teaching certain subjects;
- Awarness on students: they relate to the knowledge that teachers have about students' learning in the subject: the requirements of learning certain concepts, the parts that students find difficult, learning approaches in the subject, and alternative designs.

The "teaching orientations" component oversees the others. However, its inclusion in the PCK model is questioned for two reasons (Abell, 2007). First, an orientation is theorized as a general view of the subject teaching; and secondly, these general views of that teaching and its learning are often studied as an interaction between knowledge, beliefs and values.

The concept of teaching effectiveness: Dumay (2009) defines the effectiveness of teaching as devices and practices that promote student learning and increase their performance in a teaching context. The effectiveness of teaching is therefore the ability to achieve one's goals, to achieve one's goals, to produce a result. It is a question of the relationship or degree of conformity between the results obtained and the effects expected on the ground (De Ketele and Gerard, 2007). There are two kinds of efficiency (Sall & De Ketele, 1997), namely external efficiency and internal efficiency:- Internal efficiency is concerned with the results obtained internally in an educational system or through an ongoing training program, reflected in the relationship between educational inputs and academic or academic results. Internal efficiency results from the comparison of observable behaviors (outcomes of the teaching / learning process) of a trained or trained group with the corresponding learning objectives. External effeciency is concerned with products or effects external to the system. These external effects are generated by the education system; they are observed outside the education system itself. External effectiveness is a measure of the extent to which education meets societal goals and meets the needs of the labor market (Psacharopoulos & Woodhall, 1988).

***Teaching styles and strategies*:** In education, the style relates to the personal way of establishing the relationship with the students, managing a class or group of learning, without prejudging the methods or techniques implemented (Lewin, Lippit and White, 1939). The concept of teaching style is the particular way of organizing the teacher-taught relationship in a learning situation. One of the characteristics of the effective teacher is the ability to vary his style and strategies. The teaching strategy is a set of coordinated didactic behaviors (example: presentation, demonstration, debate ...) in order to facilitate specific learning. Inspired freely by the management work of Blake and Mouton (1964), Therer and Willemart (1983) identified and described four teaching styles that are representative of observable teaching practices. They are defined from a two-dimensional model that combines two attitudes of the teacher. Each of these attitudes is expressed in varying degrees, weak or strong, disinterest or interest. The combination of these two attitudes identifies four basic styles:

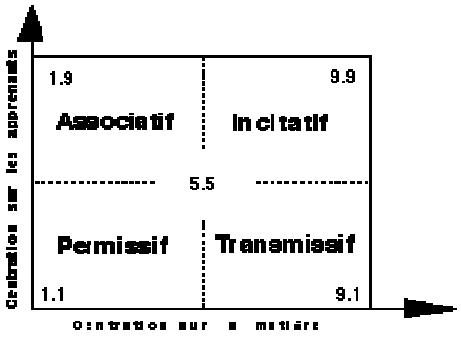

Figure 1: Therer Grid - Willemart (1983), inspired by Blake and Mouton (1964)

- Transmissive style (9.1), centered more on matter;
- Incentive style (9.9), centered on both the subject and the learners;
- Associative style (1.9), focused more on learners;
- Permissive style (1.1), with very little focus on learners and subject matter.

In addition, Therer and Willemart hypothesize that each of these four styles may be effective or ineffective depending on the situations and the more specific interventions of the teacher or trainer.

Statment of the problem: We noted in the introduction the need for the reform of the college adopted by the government on the one hand; and training that ensures both the high scientific level and the pedagogical and didactic qualities of teachers on the other hand, to cope with the demographic pressure of lower secondary school students. In the philosophical conception of bivalence, the first step is to enable teachers to make their own transfers of knowledge and know-how acquired in the simultaneous learning of the two disciplines they must teach ; and secondly, to help the latter to grasp the functioning of these disciplines in order to facilitate their understanding and acquisition. Five disciplinary blocks have been defined to bring bivalent profile teachers to acquire knowledge and develop skills. Table 1 gives the characteristics of these five disciplinary blocks currently in force in Côte d'Ivoire for the training of bivalent profile teachers. For the designers of these blocks, blocking subject together contribute to the development of a coherent set of skills in the bivalent teacher. However, on the ground they are experiencing enormous difficulties in building knowledge with learners. Indeed, the indicators of their underperformance in the teaching of these disciplines are noted during the sessions of observation of their teaching practices and the analysis of their modes of reflection and their decision-making. These difficulties have significant impacts on their teaching practices in the field. Thus, we wonder not only about the coherence and completeness of the built block but also and especially about the effectiveness of their teaching. These concerns being at the origin of our study, this article analyzes the training model of the latter and their teaching practices in the field. The exploratory work took place at the Jean Piaget which is an experimental high school of the teachers training college of Abidjan during the second trimester of the 2017/2018 school year with teachers from block 5.

METHODOLOGY

To address these concerns, we conducted our research in two phases:

The first phase: It focuses on the layout of the TS and its coherence, the objectives defined by the programs related to the skills for the two years of training. Thus, we answer the following questions: Does each TS participate directly / indirectly in the construction of one or more competences? Is there consistency between content, objectives, teaching and evaluation strategies within each TS?

The second phase: We chose the population and the research sample. The population targeted by this study concerns the first two bivalent profile college teachers' courses in the field. The sample is made up of 12 teachers, 6 of whom are from the first class and 6 from the second class. Referring to the 5 stages of development from the beginner to the expert (Berliner, 1988), these two field trips correspond to the following two categories of teachers: junior teacher (2nd promotion) and advanced beginner teacher (1st promotion). Both categories of teachers were invited to take part in the study on a voluntary basis. To ensure a better representativeness of the subjects, these teachers were chosen from their results obtained at the end of training examinations at the teachers training college of Abidjan. Thus, the choices were made as follows: two teachers (a junior high school teachers a second profile bilogy) having obtained the "Good"; secondly, two others having obtained the mention "quite well"; and finally, two other last ones having obtained the mention "faily good" all coming from block 5. Which allowed us to obtain the three profiles of professors of college according to the obtained mentions: Profile 1 for the mention "Good"; Profile 2 for the mention "pretty good"; and Profile 3 for passability. Table 2 gives the distribution of college teachers by discipline and by profile. The study that we present here refers to the following lessons: Magnet and coil in Physics-chemistry, Soil biology in the programs of the 4th class in force since the 2015/2016 academic year.
This characteristic choice of the sample makes it possible to follow each teacher in the conduct of his class. We observe the practices in the classroom, and the routines installed which would make visible the evolutions which interest us in the follow-up of the teachers.

Data collection tools: The selected teachers each presented two lessons: a first lesson in Physics-Chemistry, and a second lesson in biology. The benefits of all the teachers took place over two consecutive weeks. For the collection of data, a grid was designed and given to a team of 03 teachers including 02 educational advisers (01 in physics-chemistry and 01 other in biology); and 01 teacher researcher in discipline didactics.

The data collection was done in two phases

First phase: analysis of the training model: It focuses on the layout of the TS and its coherence, the objectives defined by the programs related to the skills for the two years of training. Thus, we answer the following questions: Does each TS participate directly / indirectly in the construction of one or more competences? Is there consistency between content, objectives, teaching and evaluation strategies within each TS?

The second phase: observation of teachers in action: For the performance of each teacher in his own class, we were provided with audio and video recordings of class sequences and interviews with each teacher, as well as data from the observation grid giving the characteristics of the situations of each teacher learning used during the observation sessions and the different knowledge a teacher needs to teach in the classroom. This grid is filled by the team committed for observation in the classroom. The total video recording time is the duration of the lesson. We had two cameras available in the classroom to record interactions between the teacher and the students. The latter was equipped with a lapel microphone, and four "ambience" mics placed in the four corners of the class. After the course, the team retrieves the written trace of the teacher and talks with him to bring him to clarify his thinking to adjust some misunderstandings. Video and audio recordings are exploited. All of these strategies allow the observation team to confirm or deny the information collected. The filling of the observation grid consists in evaluating the performance of the teacher in terms of the effectiveness of his teaching with regard to the components of the objects observed. For each object observed in the teacher's performance, four levels of performance can be associated. Table 3 provides the characteristics of the evaluation criteria (Danielson, 2011) that relate to each level of performance.

Data analysis: To obtain necessary and sufficient information about the different knowledge they use in their teaching and classroom practices, we used data from the observation team and recordings. These different sources of collected data are intended to verify their convergence. They were examined and allowed to have the results mentioned below. We analyze the degree of mastery of knowledge and classroom practices of the bivalent profile teacher that characterizes his teaching in order to evaluate the effectiveness of this teaching in the field. The content analysis was done on knowledge categories and class practices.

RESULTS AND DISCUSSION

Curriculum Outcomes: We analyzed the body of curricula and the different structures of the different teaching units in the model. The teaching of the different disciplines taught in the training is divided between fundamental teaching units (Core), specialty courses (Specialty), methodology lessons (Methodology), and general education (General Culture). All these teaching units are divided into several components of the teaching unit (ECUE). The training of bivalent profile college professors is organized in a process of gradual appropriation of skills and disciplinary knowledge: the first year, the work focuses on both the mastery of disciplinary knowledge and their didactics; the second year, the work is focused on class practices: the socialization internship. Four tables 4, 5, 6 and 7 summarize the hourly volumes of activities to be carried out during the four semesters of training of future teachers of bivalent profile.

Tables 4 and 5 below illustrate the activities of the first year of training. They identify the different teaching subject (UE) and their constituent units of teaching units (ECUE) with the hourly volumes by lecture (CM), tutorials (TD), practical work (TP), by Student Personal Work (TPE), and Total Workload (TTC) for each of Semesters 1 and 2. The reading of the professional skills expected for the professorship of the college of bivalent profile shows that they develop gradually in a process integrating theoretical knowledge and their didactics strongly articulated to each other. The integration units allowing the student to use concepts and to mobilize a set of knowledge and know-how, are related to one or more skills whose knowledge and skills are acquired during the year in progress or the previous year. The analysis of the first two semesters shows that the academic objectives predominate a little more in the physics-chemistry programs, and the sciences of life and earth: 625 hours for the Unit of Basic Education versus 200 hours for the Specialty Teaching Unit and 500 hours for the Methodology Teaching Unit; for a total of: 1325 hours. We note that the programs are extremely detailed in terms of content to be taught per term. The continuity and logic between the programs per semester are, in general, ensured.

Semester 3 consists of 02 teaching subjects 01 Methodology which is declined in Didactics of the biology with 125 hours, in Pre-internship with 150 hours, in Mini Professional Memory, in Didactics of Physics-chemistry in the college with 50 hours, and in Classroom Practice in Physics and Chemistry in college with 50 hours. 01 General Culture. Semester 4 is devoted to the internship and the writing of the internship report. Tables 6 and 7 list the characteristics of semesters 3 and 4. They more refer to integration units. These units focus on classroom practice and pre-placement. They take into account the analyzes of situations prepared by the trainers, simulated simulations, analyzes of the situations experienced during the supervision of the trainee teachers in the field and the work of transposition to new situations proposed. During the pre-training sessions, the trainer helps the future bivalent profile teacher to recognize the singularity of the situations while identifying transferable concepts with other types of situations. The validation of the integration unit does not mean the validation of the entire skill. It will only be acquired after validation of all the teaching units of the competency and the elements acquired during the internship. The training thus ensures the future professor of bivalent profile the acquisition of a set of diversified knowledge and skills: first, in the main disciplines, but also in related disciplines, and in disciplines of openness, in order to favor the acquisition of a general culture; then, in the identification and exploitation of documentary resources, as well as the handling of ICT tools; and finally, in the fields of trades associated with training, and the reinvestment of acquired skills in a professional context. The diversity of disciplines taken into account in the model implies a strong dimension of the construction of skills. However, we noticed the absence of the characteristics of the general objectives, reference skills, matrix. We note that the arrangement of the different TS over the two years of training focuses on:

- The acquisition of a set of basic scientific knowledge to enable the bivalent profile college teacher to master the disciplinary knowledge and their didactics;
- The consolidation of knowledge acquired at the level of basic education;
- The acquisition of a set of techniques allowing him to confirm his knowledge and make the appropriate decisions in class situations; an internship that is based on the implementation of the skills required in one or more situations.

The major weakness of the model is the lack of translation of general program objectives in skills development, specification of skills benchmarks. In fact, the lack of definition of the components of a competency does not make it possible to relate to the other competencies and also to the elements that a competency mobilizes. This dimension not only has an impact on the pedagogical organization and evaluation of future bivalent profile college professors, since it goes far beyond teaching to ask very complex coordination questions; but also and especially in the integration of acquisitions and their implementation into an organized set of knowledge, know-how and attitudes to perform a number of tasks. The common reflection that should be conducted by all the teachers involved in the training is not favored, it is rather the "course approach" where each teacher often reflects alone on the implementation of the TS is privileged (Sylvestre and Berthiaume, 2013). The TS adds to each other without really integrating into a coherent whole. Such an approach leads according to Prégent et al. (2009) to development that resembles a set of heterogeneous, disparate elements; and therefore does not contribute together to the development by the future bivalent profile college professor of a coherent set of skills. This is harmful for this process which is intended to be consistent with scientific approaches in the acquisition of knowledge and the development of skills. Finally, the analysis of the training model of bivalent teachers in block 5 shows that vertical and internal coherence analyzes are not possible. Indeed, concerning the analysis of vertical coherence, the aim is to assess to what extent the learning objectives targeted within

Table 1. Characteristics of different disciplinary teacher training blocks of bivalent profile

The differents subject blocks	The subjects of the block
Block 1	French, History-Geography
Block 2	French, Education for Human Rights and Citizenship
Block 3	English, Physical and Sporting Events
Block 4	Mathematics, Information and Communication Technology
Block 5	Physics-Chemistry, Biology

Table 2: Distribution of High school Teachers in the Sample by Discipline, Profile and Development Stage of the Teacher

	Dominant subject : Physics-chimistry		
	Profile 1	Profile 2	Profile 3
	1	**1**	**1**
Beginner	**Dominant subject : Biology**		
	Profile 1	Profile 2	Profile 3
	1	**1**	**1**
	Dominant subject : Physics-chimistry		
	Profile 1	Profile 2	Profile 3
	1	1	1
Advanced beginner	**Dominant subject : Biology**		
	Profile 1	Profile 2	Profile 3
	1	**1**	**1**

Table 3. Characteristics of each evaluation criterion by level of performance and the assessment of the corresponding benefit

Level of Performance	Evaluation Criteria	Assessment of the Benefit
Insufficient	The teacher does not seem to understand the concepts underlying the component	-/-
Fondamental	The teacher seems to understand the basic concepts of the component and tries to put the elements into practice. However, implementation is sporadic, intermittent and not always successful	+/-
Competent	The teacher clearly understands the concepts on which the components are based and puts them into practice.	+/+
Superior	The teacher understands the concepts on which the intended component is based.	+/+/+

Tableau 4. Summary of the hourly volumes of the semester 1 activities

	ECUE	CM	TD	TP	TPE	CTT
Fundamental subjects						
Training in chemistry	Organic chemistry	12	8		30	50
	General chemistry	20	10		45	75
Training in chemistry	Mécanique, Optique et propriété physique de la matière	20	10		45	75
	Electricité et Electronique	12	8		30	50
Specializing subjects						
Educational sciences	Awarness on the educational system		10		15	25
	Educational Psychology	8	12		30	50
	Educational Psycho-sociolog	8	12		30	50
Didactic of physics-chemistry in the college	Study of programs and textbooks		10		15	25
	Development and exploitation of didactic aids		10		15	25
Methodological subject						
Report methodology	French speaking technique		20		30	50
	Methodology of writing a report in PC		20		30	50
Intership and report	Internship of discovery or observation				50	50
Practical work of physics chemistry	Chemistry practical work			30	45	75
	PHYSICS practical work			30	45	75
Subjects of general culture						
General culture general	Music or Visual Arts					

the framework of a TS contribute or not, in an operational way, to the achievement of the one or other of the program skills. As the program competences are not defined, it is impossible to specify whether it is a direct or indirect contribution. As for the analysis of internal coherence, the lack of definitions of learning objectives, teaching methods and evaluation methods makes it impossible to assess the adequacy of these elements in the training program. However, the horizontal coherence analysis highlights the dependence of different TSs on each other in terms of prerequisites and progress; there is no lack or redundancy between two or more TSs.

It is true that the training matrix of bivalent teachers allows the development of theoretical, didactic and methodological knowledge but it lacks pedagogical coherence. This impedes the understanding of the program by bivalent teachers and the reading of the model for teachers (Basque et al., 2015).

Results relating to field practices: We analyze and discuss all the data collected according to the components of the six objects of observation. It is a question of reporting for each profile of teacher the control of each component of the various objects of observation during its delivery in the class.

Table 6. Summary of hourly volumes of semester 3 activities

	Ecue	CM	TD	TP	TPE	CTT
Subjects Of Methodology						
Didactics of svt	Study of teaching programs and textbooks in biology		20		30	50
	Management of experimental activities in biology		10		15	25
	Scientific equipment and teaching aids in biology		20		30	50
Pre-internship	Practice Analysis (Micro-teaching)		1		99	100
	Seminar		10		40	50
Mini professional memory	Mini Memory					
Didactic of physics chemistry in college	Study of programs and textbooks		10		15	25
	Development and exploitation of didactic aids		10		15	25
	Preparation, Conduct of Lessons and Evaluation in Chemistry			10	15	25
	Preparation, Conduct of Lessons and Evaluation in Physics			10	15	25
Subjects of general culture						
Living language	English					

Table 7. Summary of hourly volumes of semester 4 activities

	ECUE	CM	TD	TP	TPE	CTT
Fundamental subjects		-	-	-	-	-
Practical course	Practical internship in Biology	-	-	-	-	-
	Practical internship in Physics and Chemistry	-	-	-	-	-
Subjects of specialty		-	-	-	-	-
Portfolio of the internship	Internship report in Biology	-	-	-	-	-
	Internship report in Physics and Chemistry	-	-	-	-	-
Subjects of methodology		-	-	-	-	-
Inspections	Biology inspections	-	-	-	-	-
	Inspections in Physics and Chemistry	-	-	-	-	-

Table 8. Summary of observations made on learning situations of the dominant subject high school teacher: the physics-chemistry

Teacher profiles	Profile 1		Profile 2		Profile 3	
Subjects	**PC**	**Biology**	**PC**	**Biology**	**PC**	**Biology**
Objects of observation						
Learning situations						
-						
o Context	+/+	+/+	+/+	+/+	+/+	+/+
o Circumstances	+/-	+/-	+/-	+/-	+/-	+/-
o Tasks	+/+	+/+	+/+	+/+	+/+	+/+
- Exploitation of the situation						
o Choice of questions	+/-	+/-	+/-	+/-	+/-	+/-
o Clarity of instructions	+/-	+/-	+/-	+/-	+/-	+/-
o Operating time	+/-	+/-	+/-	+/-	+/-	+/-

Table 9. Summary of observations made on learning situations of the dominant subject high school teacher: biology

Teacher profiles	Profile 1		Profile 2		Profile 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Learning situations						
-						
o Context	+/+	+/+	+/+	+/+	+/+	+/+
o Circumstances	+/-	+/-	+/-	+/-	+/-	+/-
o Tasks	+/+	+/+	+/+	+/+	+/+	+/+
- Exploitation of the situation						
o Choice of questions	+/-	+/-	+/-	+/-	+/-	+/-
o Clarity of instructions	+/-	+/-	+/-	+/-	+/-	+/-
o Operating time	+/-	+/-	+/-	+/-	+/-	+/-

These results will allow us to evaluate the degree of effectiveness of the teaching of the bivalent profile college teacher.

First object of observation: learning situations: Tables 8 and 9 list the assessments found in the class observations of the 9 teachers in the use of learning situations during their class session.

Thus, the components on which these evaluations are carried out show that the objects of observation mastered by the teachers are: the context and the tasks. On the other hand, the components such as the "circumstance" which sometimes appear as resources (direct or indirect), sometimes as constraints (surmountable or insurmountable) for the treatment of the situation, and all those relating to the exploitation of the situation are less mastered.

Table 10. Summary of observations made on learning situations of dominant subject high school teacher: life sciences and earth physics-chemistry

Teacher profiles	Profile 1		Profile 2		Profile 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Knowledge of the discipline						
- Epistemology						
o Relevance of the proceedings	+/-	+/+	+/-	+/+	+/-	+/-
o Relevance of the methods used (induction, deduction, generalization)	+/-	+/-	+/-	+/-	+	+
o Relevance of knowledge types	+/-	+/-	+/-	+/-	+	+
o Coherence in their use	+/-	+/-	+/-	+/-	+/-	+/-
o Relevance of the advanced evidence	+/-	+/-	+/-	+/-	+/-	+/-
- History of concepts						
o Logical origin	+/-	+/-	+/-	+/-	+/-	+/-
o Their value	+/-	+/-	+/-	+/-	+/-	+/-
o Their objective scope	+/-	+/-	+/-	+/-	+/-	+/-
- Interdisciplinary approach						
o Internal relationship between disciplines in the domain	+/-	+/-	+/-	+/-	+/-	+/-
o Interrelations between the theories of the different subjects of the field	+/-	+/-	+/-	+/-	+/-	+/-

Table 11. Summary of observations made on learning situations of dominant Subject high discipline middle school teacher:

Teachers profiles	Profile 1		Profile 2		Profile 3	
Subjects	PC	biology	PC	biology	PC	biology
Objects of observation						
Knowledge of the discipline						
- Epistemology						
o Relevance of the proceedings	+/+	+/-	+/+	+/-	+/-	+/-
o Relevance of the methods used (induction, deduction, generalization)	+/-	+/-	+/-	+/-	+	+
o Relevance of knowledge types	+/-	+/-	+/-	+/-	+	+
o Coherence in their use	+/-	+/-	+/-	+/-	+/-	+/-
o Relevance of the advanced evidence	+/-	+/-	+/-	+/-	+/-	+/-
- History of concepts						
o Logical origin	+/-	+/-	+/-	+/-	+/-	+/-
o Their value	+/-	+/-	+/-	+/-	+/-	+/-
o Their objective scope	+/-	+/-	+/-	+/-	+/-	+/-
- Interdisciplinary approach						
o Internal relationship between disciplines in the domain	+/-	+/-	+/-	+/-	+/-	+/-
o Interrelations between the theories of the different subjects of the field	+/-	+/-	+/-	+/-	+/-	+/-

Table 12. Summary of Observations on Learning Situations of the dominant subject high school teacher: the physics-chemistry

Teacher profiles	Profile 1		Profile2		Profile 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Curricular knowledge						
- Reading the program						
o Mastery of text types	+/-	+/-	+/-	+/-	+/-	+/-
o Mastery of teaching styles	+/-	+/-	+	+	+	+
- Reference to the social and cultural dimension	-/-	-/-	-/-	-/-	-/-	-/-
- Mastery of knowledge to mobilize	+	+	+	+	+	+
- Mastery of skills to install	+/-	+/-	+/-	+/-	+/-	+/-
- Reference to popular science	-/-	-/-	-/-	-/-	-/-	-/-
- Control of activities and their duration	+/-	+/-	+/-	+/-	+/-	+/-

Table 13. Summary of Observations on Learning Situations of the dominant of the dominant subject high school teacher: biology

Teacher profiles	Profile 1		Profile2		Profile 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Curricular knowledge						
- Reading the program						
o Mastery of text types	+/-	+/-	+/-	+/-	+/-	+/-
o Mastery of teaching styles	+/-	+/-	+	+	+	+
- Reference to the social and cultural dimension	-/-	-/-	-/-	-/-	-/-	-/-
- Mastery of knowledge to mobilize	+/+	+/+	+/+	+/+	+/+	+/+
- Mastery of skills to install	+/-	+/-	+/-	+/-	+/-	+/-
- Reference to popular science	-/-	-/-	-/-	-/-	-/-	-/-
- Control of activities and their duration	+/-	+/-	+/-	+/-	+/-	+/-

Table 14. Summary of Observations on Learning Situations of the dominant subject high school teacher: the physics-chemistry

Teacher profiles	Profile 1		Profile2		Profile 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Pedagogical knowledge						
- Teaching strategies						
o Clearly present the learning contents to the students	+/-	+/-	+	+	+	+
o Offer additional education	-	-	-	-	-	-
o Promote student engagement with learning content	+	+	+	+	+	+
o Give feedback	+	+	+	+	+	+
o Build on the practice	+/-	+/-	+/-	+/-	+	+
o Help students use their knowledge	+/-	+/-	+/-	+/-	+/-	+/-
o Have students work together	+	+	+	+	+	+
o Develop student self-efficacy	-	-	-	-	-	-
- Teaching styles						
o Transmissive style	+	+	+	+	+	+
o Incentive style	+/-	+/-	+/-	+/-	+/-	+/-
o Associative style	+	+	+	+	+	+
o Permissive style	+/-	+/-	+/-	+/-	+/-	+/-
- Types of questions						
o True or False	+/-	+/-	+/-	+/-	+/-	+/-
o Closed	+	+	+	+	+	+
o Open	+/-	+/-	+/-	+/-	+/-	+/-

Table 15. Summary of Observations on Learning Situations of the dominant subject high school teach: biology

Teacher profiles	Profile 1		Profile2		Profile 3	
Subjects	**PC**	**Biology**	**PC**	**Biology**	**PC**	**Biology**
Objects of observation						
Pedagogical knowledge						
- Teaching strategies						
o Clearly present the learning contents to the students	+/-	+/-	+	+	+	+
o Offer additional education	-	-	-	-	-	-
o Promote student engagement with learning content	+	+	+	+	+	+
o Give feedback	+	+	+	+	+	+
o Build on the practice	+/-	+/-	+/-	+/-	+	+
o Help students use their knowledge	+/-	+/-	+/-	+/-	+/-	+/-
o Have students work together	+	+	+	+	+	+
o Develop student self-efficacy	-	-	-	-	-	-
- Teaching styles						
o Transmissive style	+	+	+	+	+	+
o Incentive style	+/-	+/-	+/-	+/-	+/-	+/-
o Associative style	+	+	+	+	+	+
o Permissive style	+/-	+/-	+/-	+/-	+/-	+/-
- Types of questions						
o True or False	+/-	+/-	+/-	+/-	+/-	+/-
o Closed	+	+	+	+	+	+
o Open	+/-	+/-	+/-	+/-	+/-	+/-

Table 16. Summary of observations made on learning situations of dominant subject high school teacher: physics-chemistry

Teacher profiles	Profil 1		Profil 2		Profil 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Didactic knowledge						
- Didactic transposition						
o External	+/-	-	+/-	+/-	+/-	+/-
o Internal	+	+	+	+	+	+
- Representations	+/-	+/-	+/-	+/-	+/-	+/-
- Obstacles	+/-	+/-	+/-	+/-	+/-	+/-
- Formulation levels	+	+	+	+	+	+
- Didactic contract	+	+	+	+	+	+

Table 17. Summary of observations made on learning situations of dominant subject high school school teacher: physics-chemistry

Teacher profiles	Profile 1		Profile2		Profile 3	
Subjects	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Didactic knowledge						
- Didactic transposition						
o External	+/-	-	+/-	+/-	+/-	+/-
o Internal	+	+	+	+	+	+
- Representations	+/-	+/-	+/-	+/-	+/-	+/-
- Obstacles	+/-	+/-	+/-	+/-	+/-	+/-
- Formulation levels	+	+	+	+	+	+
- Didactic contract	+	+	+	+	+	+

Table 18. Summary of observations made on ICT knowledge of dominant subject high school teacher: physics-chemistry

Teacher profiles	Profile 1		Profile 2		Profile 3	
Disciplined	**PC**	**Biology**	**PC**	**Biology**	**PC**	**Biology**
Objects of observation						
Knowledge of ICT						
- Knowledge of ICT	+/+	+/+	+/+	+/+	+/+	+/+
- Relevance of the documents used	+/+	+/+	+/+	+/+	+/+	+/+

Table 19. Summary of observations made on ICT knowledge of dominant subject high school teacher: physics-chemistry

Teacher profiles	Profile 1		Profile 2		Profile 3	
Disciplined	PC	Biology	PC	Biology	PC	Biology
Objects of observation						
Knowledge of ICT						
- Knowledge of ICT	+/+	+/+	+/+	+/+	+/+	+/+
- Relevance of the documents used	+/+	+/+	+/+	+/+	+/+	+/+

It is among others the exploitation of the situation where they have difficulties. They are also observed at the level of the operating time where this time, the teachers observed go beyond the allotted time. These shortcomings in the use of the identified objects of observation testify to the lack of tools in the bivalent profile college teacher to develop appropriate learning situations. This set of difficulties constitutes a pedagogical drift that hinders the effective articulation between the three parts of the learning situation. The gap clearly shows us that, despite the positive impressions at the context and task levels, it still has a lot of room for improvement. Certainly, the exploitation of learning situations is based on the following principle: "the mind of the learner proceeds not from the simple to the complex but from an implicit and diffuse complexity towards an explicit and distinct complexity", so it puts into practice competition the skills, learning, pace, and pedagogical profile of the teacher; but their conceptions are based on the ability to mobilize learning in complex tasks and situations, in school and then in adult life (Scallon, 2004).These analyzes show, in the end, that the professors observed do not seem to understand the components that underlie the learning situations. Their performance in learning situations is according to Danielson (2011) of the fundamental level.

Second object of observation: knowledge of the subject: These are the knowledge required to teach the subject and refer to the knowledge that the teacher must possess regarding the concepts and procedures of the discipline, the problem-solving strategies as well as the links between its various components. Discipline content knowledge is the knowledge that the teacher is responsible for building with the students, but this knowledge is not limited to the knowledge that it must teach. This knowledge can be of two kinds: it can relate to the organization of the concepts, facts, principles and theories or the rules governing the evidence used to generalize and justify the knowledge produced by the discipline (Schwab, cited in Abell, 2007). Tables 10 and 11 list the assessments found on the class observations of the three knowledge profiles of the discipline. The teachers' performances observed on all the components of the object of observation: Knowledge of the discipline, show that they succeed more or less well. Difficulties are noted both at the level of scientific approaches (the exploitation of learning situations in physics-chemistry is different from that of the sciences of life and the earth), the relevance of types of knowledge, coherence in their use, and the relevance of the advanced evidence constituting three of the five components of Epistemology, only to the levels of the components of the Knowledge of the discipline: History of the concepts and Interdisciplinary Approach. This results from the lack of initial teacher training in epistemology. Thus in the classroom, we note that teachers are afraid to engage in support of the student in the exercise of persuasion they should undertake. These results also confirm the concern of Fourez (1998) who deplores the fact that science education is not sufficiently linked to the social aspect of scientific knowledge. Indeed, these practicing teachers are not always able to address the social aspect of scientific knowledge since they were probably not aware of the process of social construction during their initial training. This clearly shows that the latter did not have continuous training in this regard. It may be thought that the knowledge produced by the researchers is not taught and the knowledge actually taught thus undergoes processes that are necessarily conveyed in a practice environment. For these college professors, we note that the teaching of the disciplines of bivalence poses a major challenge to them both in terms of understanding concepts and in terms of mastery of scientific approaches. This situation is explained by the university training they received, the majority of whom were trained in their basic discipline. This at least partly reflects the heavy work of appropriating the notional content of some science teachers when teaching their discipline is entrusted to them (Fourez et al., 1997); they are not trained either to take an epistemological view of their didactic positions. Thus, the interdisciplinary approach or horizontal integration linking the knowledge and interdependent skills of more than one subject to study a problem, a subject becomes problematic. Teachers lack tools to be more critical of their practice. Ultimately, the activities are not suited to the interests and learning needs of students. They do not stimulate or engage students intellectually. Their implementation is sporadic, intermittent and not always successful. Thus, the provision of these on the components of this object of observation is of a fundamental level of performance (Danielson, 2011).

***Third object of observation: curricular knowledge*:** Considered as a set of educational practices related to the mastery of educational programs that the teacher must not only know, both from the point of view of the concepts to be taught and the skills required, but also the axiological choices of the designers concerning the aims of the program. Teaching the subject and its methods of approach, curriculum knowledge allows the latter to clarify the program, to concretize, or even to materialize, to facilitate its teaching and possibly its

evaluation. The results in Tables 12 and 13 above show that the observed teachers have an acceptable mastery of this knowledge. It is the mastery of pedagogical styles, knowledge to mobilize, and skills to install. However, we note that these teachers do not refer in their teaching to the social and cultural dimension. These results also confirm the concern of Fourez (1998) who deplores the fact that science education is not sufficiently linked to the social aspect of scientific knowledge. Indeed, these teachers who have been practicing for several years are not always able to address the social aspect of scientific knowledge, since they were probably not aware of the knowledge building process since they did not have continuing education in this sense. We also note that the knowledge produced by researchers is not taken into account in their teaching. But to refer to the popularization of science to make its teaching comprehensible allows the learner to situate himself in the world. The teachers observed are deprived, since they have not always received sufficient training, in the face of educational diversification. These results show that bivalent profile college teachers have a fundamental level of performance. This explains the fact that they seem to understand the basic concepts of the component and they try to put the elements into practice. Classroom activities are not suited to the interests and learning needs of students. They do not stimulate or engage students intellectually. Thus, their implementation is sporadic, intermittent and not always successful (Danielson, 2011).

Fourth object of observation: pedagogical knowledge: Pedagogical knowledge is the teaching strategy in terms of planning, learner motivation and classroom management. They refer to the general knowledge of the teacher about teaching, without being linked to a subject content. This content-related knowledge is the knowledge that a teacher develops to help students understand and learn content (Shulman, 1987). They are related to the organization of the lesson, the choice of activities to be put in place to facilitate learners' understanding of the concepts, the organization and management of interactions in the classroom to enable students to reason and give meaning to the concepts introduced. The results obtained in relation to pedagogical knowledge show that the teachers observed have difficulties in mastering the components of the teaching styles and types of questions. Their uncertainty about the mentioned components and pedagogical practices leads them to privilege the didactic propositions that they transpose again according to their notional and didactic skills (Carette, 2008). Thus, these teachers play a rather technical role in relation to the procedures they use and do not enter into a process of accompanying learners during the exercise of persuasion that is necessary for understanding. These difficulties are due to the fact that these teachers are not trained either to put an epistemological view on their didactic positions (Fourez et al., 1997). In sum, these results lead to avenues for initial training and also for continuing education. Since graduation requires knowledge and achievement in both academic subjects, the way in which this knowledge is imparted also plays a role in the persistence of bivalent college teachers. Successful teaching strategies are as much about classroom management as teaching techniques (Cusset, 2011). They must then learn to observe new indicators in the student learning process and master a wealth of examples and contrasts to capture learning opportunities, and finally to see how these changes affect the learning process. Learning and the ability to write learners. "It goes without saying that all teaching practices are not equal […]. It is therefore important to identify and promote the most effective practices, that is, those that help students to learn what they want. "(Gauthier et al., 2004). It is therefore necessary to rethink the training of teachers, their support and professional development, based on a good knowledge of research.

Fifth object of observation: didactic knowledge: Didactic knowledge is the learning difficulties that learners are likely to encounter and how to take them into account. For Morge (2009), they have the particularity of being dependent on the disciplinary content taught, which makes them much more precise knowledge than knowledge about school discipline, and that some are even usable only for a given session. Lebrun and De Hosson (2017) indicate that they are "largely dependent on the subject content to be taught" and correspond to "the teacher's knowledge of what needs to be taught, the difficulty or otherwise of the simple nature of a subject teaching, possible difficulties for pupils (beyond knowledge of their achievements) ". Didactic knowledge is therefore linked to the action, and can be acquired or modified by professional practice. Tables 16 and 17 list the assessments of class observations of the three teacher profiles in terms of pedagogical knowledge. They note that teachers do not experience major difficulties in didactic transposition, and levels of formulation. It should be noted, however, that at the levels of representations and barriers, teachers experience enormous difficulties. This indicates that they have not been formally trained in didactic concepts. This confirms the words of Jonnaert et al. (2005) that didactic training should not only provide teachers with pedagogical and didactic tools, but also make them more critical of their practice. He stresses the importance of exploring for each concept to teach the prevailing and recurrent conceptions that are encountered in students as they are resistant to teaching efforts.

This resistance is the result of the presence of a number of epistemological and / or imaginary obstacles with strongly anchored and functional structures in the learner. Astolfi (2001) describes this resistance as rational because it is the manifestation of savings of thought, of a good form of stable perception to which the student's mind continually refers. Obstacles then constitute the hard core of the representations, they give them a meaning which makes it possible to derive an interpretation from them. The evolution of knowledge in the didactics of science concerning representations and obstacles has also favored the consideration of cognitive conflict. This conflict, defined by Piaget (1975) as the possibility that the same subject has different systems according to the domains and situations has a more social dimension hence the expression socio-cognitive conflict.

Sixth object of observation: ICT knowledge: ICTs stand Information and Communication Technologies for Education. They cover digital tools and products that can be used in education and teaching (ICT = ICT + Education). ICTs are a collection of tools designed and used to produce, process, store, exchange, categorize, retrieve and read digital documents for teaching and learning purposes. Clearly, it is to highlight modern technologies to include them in education. We can also talk about the use in educational context of digital tools (TICES tools) in the service of learning strategies. One of the essential questions for teachers is how to integrate ICT into their pedagogy? Tables 18 and 19 list the assessments on class observations of the three profiles of bivalent profile college

teachers in terms of knowledge of ICT. The results indicate that the teachers observed have a perfect mastery on ICT. This mastery is explained by the fact that with these tools they bring an added value to the teaching. They build with their learners relevant learning. We note that ICTs facilitate collaborative work, promote cooperative learning, and enable exercises to be modulated more efficiently. They also enable learners to better present results and acquire skills that are increasingly in demand in our society. Mastery of ICT knowledge components that observed bivalent teachers have general knowledge of the media context in which students evolve, pedagogical, methodological and didactic skills. They clearly understand the concepts underlying the two components of ICT knowledge and put them into practice (Danielson, 2011). However, in a world where digital technologies are evolving constantly and very rapidly, the initial and in-service training of teachers must be strengthened so that ICT are integrated into the didactics of the disciplines.

Conclusion

Through this study, we have sought to find answers to two questions : on the one hand, the layout of the teaching subject and their coherence; and on the other hand, the professionnal performances of teachers graduated from the experience of bivalent high school teachers (Physics-Chemistry and Biology) training program at the teachers training college of Abidjan. Regarding the layout of the teaching subjects and the analysis of the coherence of the model, we have noticed the lack that learning objectives were not translated to competences and skills. Indeed, there is a link between the teaching subjects and the theoretical, didactic and methodological knowledge learnt. That allows the compatibility of the teachings with each other. But, due to a lack of pedagogical coherence in the the training model, teachers-trainers and their learners cannot understand the training model.

The survey shows a number of deficiencies with regard to the trainees awarness about learning situations, the subject taught, curricular matters, pedagogy, didactics and ICTs. Such a deficiency does not allow the construction of knowledge and the development of skills in both of the two subjects. The difficulties noted are important both at the level of the second subject and in their the scientific approaches. Therefore, it is our contention to review the training model and promote the program approach as to motivate trainees to develop more professionnal competences and and make teaching effective in the field. The limit of this research is then due to the limited size of the sample. To generalize the results obtained, it should be possible to extend the survey to a representative sample.

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