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Image of science in the evaluation practices of those involved in teaching physical sciences in Benin: Analysis of the content of the speeches

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Abstract
This article aims to characterize the knowledge subject to assessment in physical sciences at the baccalaureate in series C and D and to determine how this knowledge is dependent on the organization and institutional curricular evolution put in place.
From the point of view of the method, on the one hand, we built a grid characterizing what is asked of the students of the C and D series at the baccalaureate in terms of analysis of the content of the elements of speech. Seven baccalaureate subjects served as support for this study with regard to the epistemological ideas conveyed on science.
The results tend to show the conformity of the baccalaureate physical science assessment tests with the official prescriptions despite the changes which have occurred in them. In addition, the study has shown that the baccalaureate in the C and D series in physical sciences only assesses students' objects of reasoning, simple know-how and is hardly concerned with skills, epistemological objects such as the image of science, models and modeling necessary for problem solving. The implications must be questioned.

Keywords: evaluation, physical science, official programs

1. Introduction
In the teaching and learning process the question of assessment is essential. But it does not seem to be the subject of much investigation in science teaching.
Our research is part of those carried out by Figari and Tourmen, 2006 [12]... It questions the evolution of the evaluation of scientific knowledge of certification to the test of successive changes which have occurred in the study programs in Benin. After the presentation of the theoretical framework of reference to our work, we expose the method used before presenting the results that we have obtained and that we are discussing.

2. Theoretical and problem framework
2.1 Theoretical framework
The institutional subjugations of the Anthropological theory of Didactics (Chevallard, 1992 1999, 2003, 2005, 2007) [5, 6, 7, 8, 9, 10] and the referentialization in science didactics (Figari *et al*. 2006, 2013) [12] and the modeling of (Martinand, 1994) seem to offer a favorable breeding ground for the analysis of discourse and evaluation practices.
In fact, according to Chevallard (2003) [8], the term institution is defined by "a" total "social system, which can certainly have only a very limited extension in the social space (there are" micro-institutions "), but which allows - and imposes - on its subjects, that is to say on the people who come to occupy the different positions offered there, the bringing into play of own ways of doing and thinking" (Chevallard, 2003) [8]. Thus a good subject occupying a position in an institution, is, a person for whom the personal relationship to the object is consistent with the relationship that the institution expects from a subject who occupies this position. The person is thus "an emergent of his past and present subjugations, to which we can therefore never reduce him" (Chevallard, Ibid). Figari (2006) [12] finally proposed a modeling of the acts involved in any evaluation activity through its "referentialization" model, applied to the evaluation of devices but also applicable to other evaluation objects (Figari and Tourmen, 2006) [12]. Any evaluation begins, according to him, with the construction / clarification of "referents" (elements allowing to assign a value to the "referenced" to the measures), what he called a phase of "referentialization". This phase consists of constructing an evaluation reference system which explains the referents and referees sought, it is followed by a phase of data collection ("referees") on the object evaluated then a comparison of the "referees" with "Referents", which constitutes the act of judgment itself, making it possible to assign a value to the object evaluated.

2.2 State of the problem
In recent years, research in education has focused on the evaluation of learning. They show that the evaluation aims at acquiring the skills installed during learning.
Bercier-Larivière and Forgette-Girou (1999) [2], in their study, showed the inadequacy of the psychometric model (Trahan & Dassa, 1978) [18] with school situations. They proposed the concept of trueness as a quality criterion for classroom assessment results. This concept takes into account the relevance of the assessment task in relation to the skills targeted, its consistency with the teaching activity, its transparency for the student and the absence of any circumstantial disadvantage.
Bonora (2013) [3] examined the procedures for evaluating student learning in the exclusive context of the manifest curriculum and the intentional curriculum responding to varied or even heterogeneous needs which imply, depending on the case, specific metric qualities. The author has

categorized school assessments into three main types: summative assessment with or without certification; prognostic evaluation, the purpose of which is to decide on a new cycle of study for a student, and diagnostic evaluation with the aim of regulating learning.

Since gaining independence, the Beninese education system has experienced three major moments: content-based programs, programs by objectives (PPO) and Competency Based Approach (CBA) generalized since 2011 and currently in force. At each of these moments in the evolution of the curriculum, teachers' practices are bound to change. We have postulated that a valuable indicator of these changes is the baccalaureate C and D physical science test. Specifically, changes are expected in evaluation practices in response to these institutional prescriptions. By asking the question to what extent the teachers of physical sciences occupying in the institution teaching physics, the position of authors of baccalaureate exams are they good subjects of the institution, our study proposes to " examine the way in which the subject of evaluation in physical sciences in Benin follows this institutional curricular dynamic or in a specific way the discourse of the subject of physical sciences at the baccalaureate conveys an image of science conforming to the epistemological characteristics of science whose option is made by Benin through the Competency Based Approach (CBA).

3. Methodology

To answer our question, we collected seven subjects from the baccalaureate exams in physical sciences) and the speech elements of these subjects were analyzed with a reading grid and analysis of the speech elements. The texts were divided into speech elements according to the object targeted by the speech element, then codified. The indicators of the grid were used to characterize each element of discourse. Studies confirm that evaluators compare many referees with referees using criteria and indicators, but the process remains partly implicit because the criteria and indicators used to judge are not always all verbalized or fully explicit (Hurteau, Houle and Guillemette, 2012, Tourmen and Figari 2006) [12]. This necessarily leads to diverse responses from teachers to institutional prescriptions, ranging from observance to open or insidious resistance to change. In a recent study (Magbonde, Dognon, Dandjinou and Attikleme 2018), analyzed physical science tests at the Beninese baccalaureate from 1995 to 2015, that is to say twenty years of evaluative practices. This study showed that the knowledge subject to evaluation does not respect the institutional curriculum dynamics. The present study aims to characterize the image of the nature of science conveyed by our subjects and specifically, the image of science that conveys the discourse of the teacher in the subject of physical sciences at the baccalaureate, it therefore seemed useful to us target the authors of selected baccalaureate physical science tests in the target population for this research. Since we are in a phase of generalized implementation of the APC with a constructivist anchor, we thought that the discourse should target epistemological objects and therefore convey a constructivist image of science so that physical science teachers occupy the position of authors of baccalaureate assessment subjects are good subjects of the institution.

4. Results of the study and discussion

The analysis of the elements of speech of the seven subjects of the Baccalaureate gave the results which we have illustrated in figure 1 above. Out of 445 identified speech units, 308 or 69.21% reflect a positivist image of science, compared to 101 units, or 22.69% which carry the semiotic clues of an inductivist view of science. Traces of other images of the nature of science are disseminated in some elements of discourse on the 7 baccalaureate tests analyzed, in proportions of 2.69% for an empiricist image (V1) and 2.92% for an image constructivist (V4) of science and 22.69% for the objectivist vision (V2).

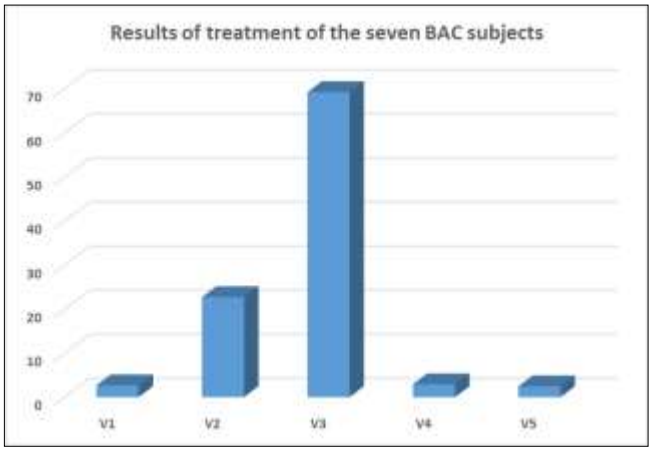

Fig 1: Analysis of the professor's speech in the seven subjects of the BAC

The subject of the certification evaluation of the baccalaureate in physical sciences in Benin projects by the discourse of the teacher author, a positive positivist image of science.

4. Conclusion

The analysis of the speeches of the evaluation tests in physical sciences at the Beninese baccalaureate allowed us to highlight that the discourse projects a positivist image of science and therefore does not respect the institutional curriculum dynamics. This study makes us say that the teachers of physical sciences of Benin, occupying the position of author of subject of assessment in the baccalaureate are from the point of view of the TAD of the bad subjects of the institution. Can we see there, a deliberate educational pedagogical hypocrisy, a problem of relevance and validity of the prescription or then of the teacher's difficulties in conforming their practices to the institutional prescriptions? A constructivist image of science is expected, but a positive positivist image is echoed by the observations of Brickhouse (1990) [4]; Lederman (1992) [14]; de Hosson and Caillarec (2009) [13] and de Maurines and Beaufils (2011) [15], science teachers convey, through their practices, inappropriate ideas of science which influence students' learning.

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