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Teachers' conceptions of Environment in Togo

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ABSTRACT

This communication aims to assess the conceptions of Togolese teachers (in service and in pre-service) about environment. Many studies have highlighted the role of anthropocentric and ecocentric values on teachers and students' conceptions about environment. Anthropocentrism is 'human-centred', conferring intrinsic value mainly to humans. Ecocentrism is 'ecosphere-centred', emphasising the intrinsic value of the interrelated ecological systems. Moreover, a new conceptual axis related to anthropomorphic perspectives has been introduced in this work to analyse teacher's conceptions. To what extent are the Togolese teachers aware of the importance of preserving the environment? Is there some correlation between their ecocentric, anthropocentric and anthropomorphic conceptions? To answer these questions, the Biohead-Citizen questionnaire was administered to 277 primary and secondary teachers, in service or pre-service, in Togo. Multivariate analyses show the presence and autonomy of the three kinds of conceptions, nevertheless with a positive correlation between ecocentric and anthropomorphic conceptions. Primary school teachers are more anthropocentric than their colleagues. These results are discussed in the perspective of improving environmental education in Togo. The discussion also includes a comparison between Togo and four other West and Central African countries (Senegal, Burkina Faso, Gabon, and Cameroon).

KEYWORDS

Environmental Education, teachers' conceptions, Togo, anthropocentric attitudes, ecocentric attitudes, multivariate analyses

RÉSUMÉ

Cette communication vise à évaluer les conceptions des enseignants togolais (en service et en formation initiale) à propos de l'environnement. De nombreuses études ont mis en évidence le rôle des valeurs anthropocentriques et écocentriques sur les conceptions des enseignants et des élèves au sujet de l'environnement. L'Anthropocentrisme est «centré sur l'humain», conférant une valeur intrinsèque principalement aux humains. L'Écocentrisme est «écosphère centrée», mettant l'accent sur la valeur intrinsèque des systèmes écologiques interdépendants. En outre, un nouvel axe conceptuel lié aux perspectives anthropomorphiques a été introduit dans ce

travail pour analyser les conceptions des enseignants. Dans quelle mesure les enseignants togolais sont conscients de l'importance de la préservation de l'environnement? Y a-t-il une corrélation entre leurs conceptions écocentriques, anthropocentriques et anthropomorphiques? Pour répondre à ces questions, le questionnaire Biohead-Citizen a été administré à 277 enseignants du primaire et du secondaire, en service ou en formation initiale au Togo. Les analyses multivariées montrent la présence et l'autonomie des trois types de conceptions, néanmoins avec une corrélation positive entre les conceptions écocentriques et anthropomorphiques. De plus, les enseignants du primaire sont plus anthropocentriques que leurs collègues. Ces résultats sont discutés dans la perspective de l'amélioration de l'éducation environnementale au Togo. La discussion comprend également une comparaison entre le Togo et quatre autres pays d'Afrique occidentale et centrale (Sénégal, Burkina Faso, Gabon et Cameroun).

MOTS CLÉS

Éducation environnementale, conceptions des enseignants, Togo, attitudes anthropocentriques, attitudes écocentriques, analyse multivariée

INTRODUCTION

Multiplication and the growing importance given to international meetings devoted to environmental concerns warn of the seriousness of the current degradation. It is therefore important to play crucial role in this historical turning point where effective measures must be taken to halt and reverse these degradations worldwide. If nothing is done, the point of no return may be achieved.

Environmental Education for Sustainable Development (ESD) is promoted by UNESCO and by most national politics for education (UNESCO, 2009a, 2009b; Clément & Caravita, 2011). Teachers are key-actors to implement it, and several researches analyzed the teachers' conceptions of environment in several countries (Munoz, Bogner, Clément & Carvalho, 2009; Clément & Caravita, 2012).

These conceptions are generally characterized by two poles: anthropocentrism and ecocentrism. Anthropocentrism is '*human-centred*', conferring intrinsic value mainly to humans (Callicott, 1984; Larrère, 1987). Ecocentrism is '*ecosphere-centred*', emphasizing the intrinsic value of the interrelated ecological systems (of which humans are a part). These two poles of attitudes are respectively called "*Utilization*" and "*Preservation*" in the 2-MEV model (Wiseman & Bogner, 2003; Bogner & Wiseman, 2004; Munoz et al., 2009; Milfont & Duckitt, 2010).

A third pole has been added: - "anthropomorphism" (Quinn, Castéra & Clément, 2016), a conception that animals can feel and think like humans.

Objective

This communication aims to assess the conceptions of Togolese teachers (in service and in pre-service) about environment according to the 3 poles: To what extent are the Togolese teachers aware of the importance of preserving the environment? Are there correlations between these three poles? Do the Togolese teachers' conceptions differ depending they teach in Primary or Secondary schools, teaching Biology or Language? Finally, only in the discussion, we will compare these Togolese teachers' conceptions with those of teachers in other West and Central Africa countries.

Context

In Togo, the teachers of primary and secondary school are trained in teacher training schools. Access to these schools, by competition, is subject to obtaining the minimum of BAC (A-levels) contrary to the Burkina Faso primary teachers, accessing teachers' training school with the BEPC (GCSE).

However, in-service teachers in Togo are not all from these training schools because they have not worked continuously since their establishment. So many teachers' waves are the product directly from the University. This is not without consequences on the organization of the pedagogical act since they did not have any pedagogical training.

Although the training textbook for primary teachers does not specify that they must have specific expertise in education for sustainable development, many courses have related content to sustainable development. Education for sustainable development is thus implied. But because sustainable development is supposed to be taught in all subjects and all teachers, content related to it could not be taught.

METHODOLOGY

Sample

Our data come from primary and secondary teachers, in service or pre-service, in Togo. Regarding teachers in service, data collection took place in the educational region Golfe -Lomé in which the capital of the country Lomé is located. These teachers were randomly selected from primary and secondary schools in Lomé. Concerning the pre-service teachers, the data collection took place partly at the École Normale Supérieure (ENS) of Atakpamé, (160 kilometers from Lomé) because ENS is the only training school for secondary school teachers in Togo; and partly at the École Normale d'Instituteurs (ENI) of Tabligbo, 80 km from Lomé. At the ENS, the survey covered all pre-service Biology and French teachers. For ENI, 50 pre-service teachers who accepted to participated in the survey were selected

The BIOHEAD-Citizen methodology recommends to gather data from six groups of 50 teachers each. In order to compensate some bad completed questionnaires, we asked a little more than 50 teachers when possible, but a little less for secondary pre-service teachers because, either in French or in biology, the whole population does not reach the 50. After suppression of the questionnaires where >5% questions were not filled out, we had a total of 270 filled questionnaires coming from the six groups:

- InP - 50 in service primary teachers;
- PreP - 51 pre-service primary teachers;
- InB - 44 in service Biology teachers of secondary;
- PreB - 32 pre-service Biology teachers of secondary;
- InL - 50 in service French language teachers of secondary;
- PreL - 43 pre-service French language teachers of secondary.

Questionnaire

We used the Biohead questionnaire, developed and validated by the research project Biohead-Citizen (Carvalho, Clément, Bogner & Caravita, 2008). It includes:

- seven questions related to anthropocentric attitudes A4, A16, A17, A18, A32, A54, A23;
- eight questions related to ecocentric attitudes: A1, A5, A7, A11, A22, A28, A40, A50;
- three questions related to anthropomorphic attitudes: A10, A29, A45;
- five questions related to pro or anti-GMO opinions: A13, A47, A49, A12, A39;
- and seven questions related to practices: A61, A56a, A56b, A56c, P6, P7, P8.

All these questions are randomly distributed inside the questionnaire. For each question the respondent was asked to take a position on a Likert scale of four boxes between “I agree” and “I don’t agree”.

To collect filled questionnaires, two modes of administration were chosen. In the first mode, teachers were grouped and filled in the questionnaire forthwith. In the second mode, the questionnaire was given to their responsible who did the same and then gave us back the filled questionnaires. In any case, when each teacher gave back the filled questionnaire, there was a fast verification to see if he / she effectively answered to all the questions. This administration of the questionnaire started in November 2015 and was achieved at the end of February 2016 in Togo.

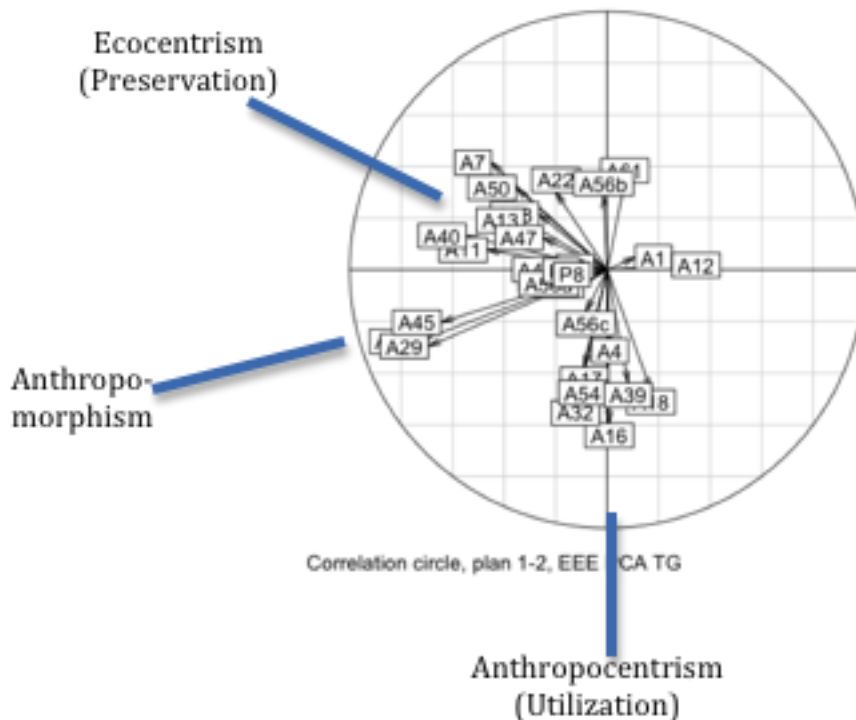
Data analysis

The answers of Togolese teachers were analyzed using the "R" software for multivariate analyses: Principal Components Analysis (PCA) and between-class analyses (Munoz et al., 2009). These conceptions were compared, in the discussion, with data under publication to teachers from four other countries in West Africa.

RESULTS

The Principal Components Analysis

FIGURE 1



PCA – Correlation circle from all the questions related to Environment (Plan 1-2, from the two main principal components)

Anthropomorphism

The first principal component concerns the three items related to anthropomorphism: at left of the horizontal axis of the Figure 1 are the teachers thinking that snails, flies or frogs are able to feel happy, at right of this axis are the teachers thinking these animals are not able to feel happy. It is interesting to notice that most of teachers totally or rather agree with these anthropomorphic items: 80% for the frogs, 70% for the flies and 71% for the snails. That is probably linked to traditional beliefs giving soul to any animal. The other teachers are more influenced by the scientific knowledge in neuro-ethology showing that the brains of these animals are not able to support this complex sentiment.

Anthropocentrism

The second principal component is mainly related to the pole Anthropocentrism (Utilization in the 2-MEV Model): below of the vertical axis (Figure 1) are the teachers who ticked the anthropocentric conceptions of six items, and at the upper part of this vertical axis are the opposite conceptions. A little more teachers ticked anthropocentric conceptions than the non anthropocentric ones: e.g. for the item A16 (“*Our planet has unlimited natural resources*”), 116 ticked “*I agree*”, and 42 “*I rather agree*”: i.e. 158 of the 270 teachers (59%). The same ratio (about 50%) is observed for the five other items related to anthropocentrism, but is a little lower (43%) for the item A4 (“*Nature is always able to restore itself*”). Only the answers to the item A23 (“*We need to clear forests to increase agricultural areas*”) are not correlated to the other anthropocentric items: only 13% of teachers ticked *I agree* or *I rather agree*. Even if Togolese teachers tend to consider nature as resources in a perspective of utilization of environment, in particular as agricultural resources, there is a strong respect of forests, possibly because forests are more considered also as resources than as wild nature to protect.

Ecocentrism (Preservation)

Togolese teachers globally plebiscite the ecocentric conceptions: 94% totally agree with “*A1 – We must set aside areas to protect endangered species*”; 70% with “*A7 - Humans will die out if we don't live in harmony with nature*”; 69% with “*A22 - I enjoy trips to the countryside*”; 69% with “*A40 - It is interesting to know what kinds of animals live in ponds or rivers*”; 77% with “*A50 - All contemporary plant species should be preserved because they may help in the discovery of new medicines*”.

These ecocentric positions are less important when they are in competition with some possible work, in agriculture (33% of teachers totally agree with “*A5 - If an intensive chicken farm were going to be created near where you live, you would be against this because it may pollute the groundwater*”; or in industry (29% of teachers totally agree with “*A28 - It makes me sad to see the countryside taken over by building sites*”).

The Figure 1 shows that the answers to the items related to Ecocentrism are in a middle position between the axis Anthropomorphism and the axis Anthropocentrism. They are only partly orthogonal to the anthropocentric conceptions, while the orthogonality is conform to the 2-MEV Model (Munoz et al., 2009), because several of them are correlated to anti-anthropocentric conceptions (as A7, see above). The horizontal axis of the Figure 1 illustrates a certain correlation between ecocentric and anthropomorphic conceptions.

Are there correlations between anthropocentric, ecocentric and anthropomorphic conceptions?

The opposition, along the vertical axis of the PCA (Figure 1) between anthropocentric and ecocentric conceptions suggests a possible negative correlation between these two sets of conceptions. The Pearson's product-moment correlation show that this negative correlation is low ($r = -0.119$, $p\text{-value} = 0.05$).

The obliquity of the axis Anthropomorphism, between the axes Ecocentrism and Anthropocentrism, suggests possible other correlation. Nevertheless, the Pearson's product-moment correlation shows no significant correlation between Anthropomorphism and Anthropocentrism (p-value = 0.10), but a low but significant correlation between anthropomorphic and ecocentric conceptions ($r = 0.203$; p-value = 0.0008).

Genetically Modified Organisms (GMO)

Only the answers to one of the five items related to GMO are correlated with the anthropocentric conceptions: A39 (“*Genetically modified plants are good for the environment because their cultivation will reduce the use of chemical pesticides (e.g. insecticides, herbicides)*”): 49% of teachers ticked *I agree* or *I rather agree*. This result probably means that GMO are not considered as possible and interesting utilization of the environment, except when their use is claimed to reduce the dangers of pesticides that are very important in Africa.

The answers to two items related to GMO are correlated with ecocentric conceptions (the pole Preservation): 65% of the teachers answered *I agree* or *I rather agree* to A13 (“*Genetically modified organisms are contrary to nature*”), and 55% answered *I agree* or *I rather agree* to A47 (“*Genetically modified plants are harmful to the environment because they will contaminate other crop plants, menacing their survival*”).

The item A49 is more correlated to the scientific knowledge related to GMO, and 66% of teachers had the good knowledge, disagreeing with “*If a person eats genetically modified plants, his/her genes can be modified*”, while the other third was more anti-GMO, agreeing with this proposition.

Finally, the answers to the fifth item related to GMO show that Togolese teachers are not systematically against GMO: 66% of them answered *I agree* or *I rather agree* to A12 (“*Genetically modified plants will help to reduce famine in the world*”).

Practices

The answers to the questions related to practices are not clearly correlated with one of the three axes showed from the PCA (Figure 1). It is nevertheless interesting to notice for 84% of teachers the goal of environmental education is more “*Developing responsible behaviour*” than “*Providing knowledge*” (item 61).

Variations with controlled parameters (Between-class Analyses)

The precedent paragraph shows that sometimes a majority of Togolese teachers agreed (or disagreed) with some items, while in other case, they expressed a variety of conceptions related to some topics. Are these conceptions correlated with some of controlled parameters?

To answer to this question, we did several between-class analyses, each time completed by a randomization test (Monte Carlo type) to identify if the observed differences are significant or not (Munoz et al., 2009).

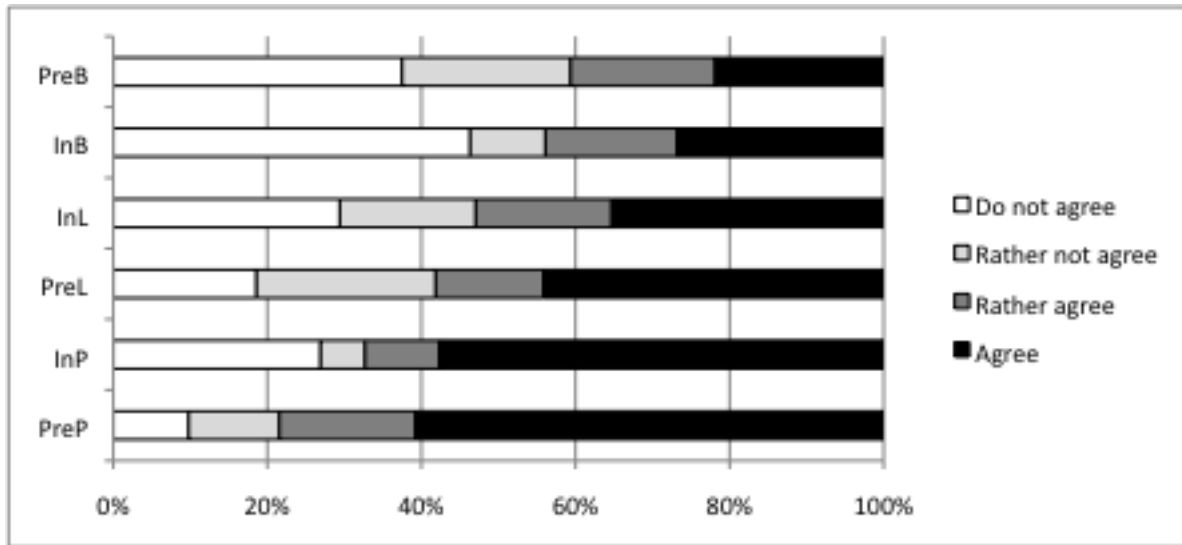
The results show that the Togolese teachers’ conceptions related environment did not vary depending the teachers’ religions, not the teachers’ gender.

They don’t vary when comparing teachers with or without university degrees in biology, but they significantly vary when comparing the level of instruction of teachers (whatever is the matter of their instruction): the 96 teachers with less than 3 years of training at University are more anthropocentric than their 165 colleagues with 3 years of training, and even more than the 9 teachers with more than 3 years of training at University.

When comparing the six samples, Primary school teachers differ from the other samples, being a little more anthropocentric (items A16, A17, A18, A39: Figure 2 for the item A16). Moreover, the in-service primary school teachers (InP) are more anthropomorphic than the pre-service primary school teachers (PreP; items A45, A29, A10: Figure 3 for the item A45). The

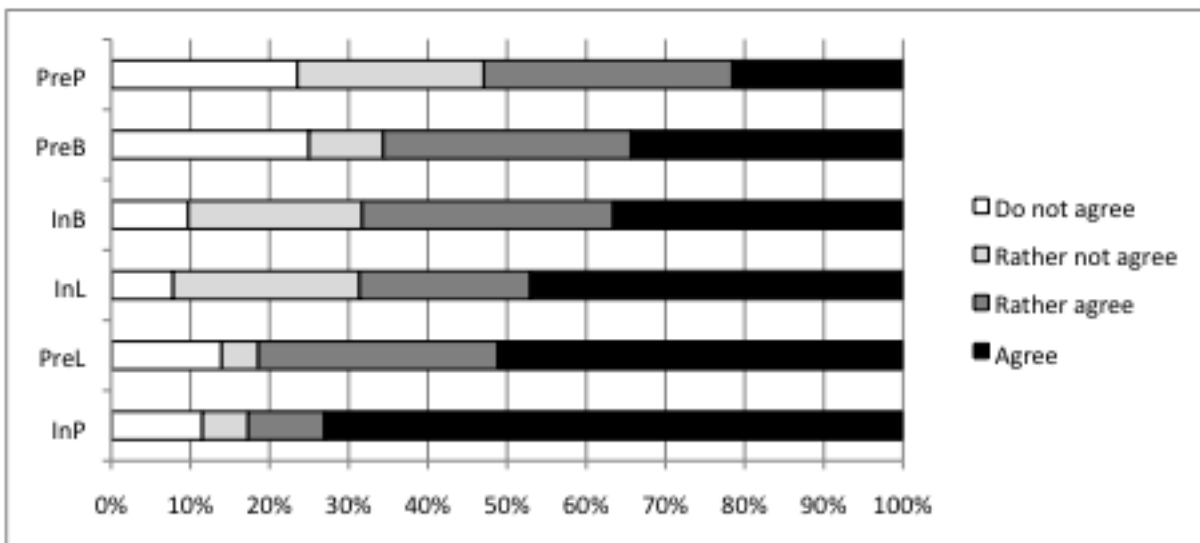
comparison between the Figures 2 and 3 illustrates the absence of correlation (mentioned above) between anthropomorphism and anthropocentrism.

FIGURE 2



Togolese teachers answers to the item A16 (“Our planet has unlimited natural resources”).

FIGURE 3



Togolese teachers answers to the item A45 (“Flies are able to feel happiness”).

DISCUSSION

Our results show that Togolese teachers are more ecocentric than it was expected. For instance 86% of them think that the goal of Environmental Education is more to develop responsible behaviour of children than only their scientific knowledge. A majority of them are also anthropomorphic and can be also anthropocentric. These results illustrate the large independence of these three sets of attitudes, with an exception: the positive correlation between anthropomorphic and ecocentric conceptions. The independence of anthropocentric

(utilization) and ecocentric (Preservation) attitudes was already showed by the 2-MEV Model (Wiseman & Bogner, 2003). Nevertheless, our results show a negative correlation between these two poles, but at the limit of signification (p-value = 0.05), ecocentric attitudes being opposed to anthropocentric attitudes. The most interesting result is the positive correlation between anthropomorphic and ecocentric conceptions, that was not yet described, and is interesting to consider in an educational perspective.

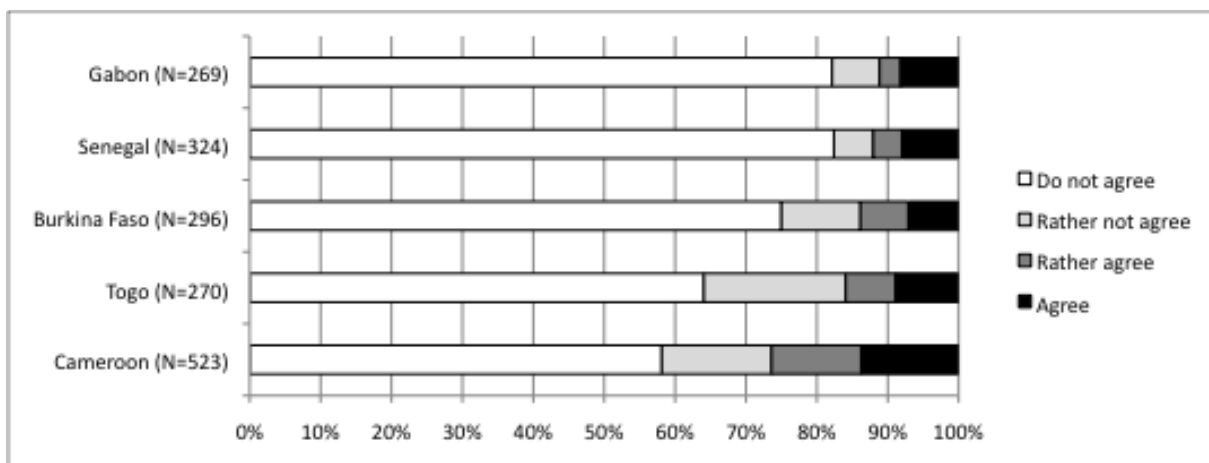
While 79% of Togolese teachers are more confident in scientists than in members of Parliament (question A56a), for 70% of them “*Flies are able to feel happiness*” (Figure 5), that is not proved at all by scientific research and that shows their anthropomorphism: for them, flies (question A45), or snails (question A10) or frogs (question A29) or probably other animals, feel as we, human beings, do. Nevertheless, this non scientific anthropomorphic conception is positively correlated with ecocentric conceptions that are promoted by the goals of Environmental Education. There is here a paradox, that merits to be investigated in the future: is there contradiction between scientific (non anthropomorphic) conceptions and ecocentric conceptions? The Togolese anthropomorphic conceptions are probably linked to animism, which is very present in Togo even if people claim to be Christian or Muslim. Moreover, children are generally spontaneously anthropomorphic: is it a facilitation to adopt ecocentric attitudes, but also an obstacle to learn some scientific knowledge?

The Togolese teachers’ attitudes related to GMO are not dogmatic at all. While most of them think that GMO are contrary to nature, they also agree to use GMO as resources, for instance to reduce famine in the world.

Finally, we can compare our results from Togo with those obtained until now in other West African countries. The figures 4 and 5 start this comparison. Figure 4 shows that the anthropocentric conceptions of Togolese teachers do not significantly differ from those observed in the four other West African countries: in the five countries, 75 to 87% of teachers disagree or rather disagree with the item A32 (“*Humans have the right to change nature as they see fit*”).

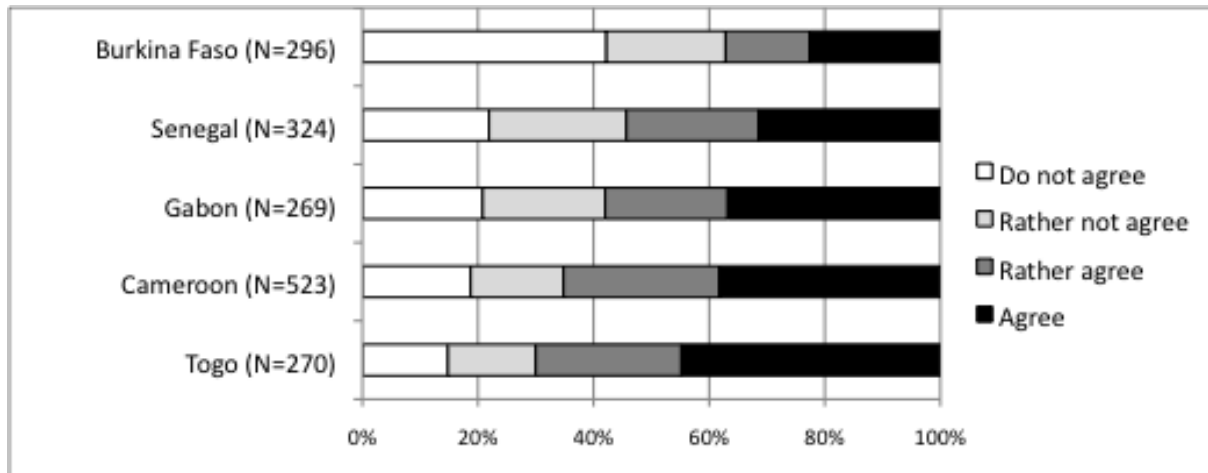
Nevertheless, the Togolese teachers are a little more anthropomorphic than are their colleagues in Burkina Faso, as illustrated by the Figure 5 (item A45 “*Flies are able to feel happiness*”).

FIGURE 4



Teachers answers to the item A32 (“*Humans have the right to change nature as they see fit*”), grouped by country.

FIGURE 5



Teachers answers to the item A45 ("Flies are able to feel happiness"), grouped by country.

These comparisons identify the specificities of Togo when compared to other West African countries, but also the similar conceptions among these West African countries, that strongly differ from those observed in France: most of the French teachers are less anthropocentric and less anthropomorphic than their African colleagues.

At the start of this research, the main questions were to know to what extent are the Togolese teachers aware of the importance of preserving the environment?

Our results show that in general the Togolese teachers are in favor of preserving the environment. However, this predisposition to environmental conservation is less important when they are in competition with the human immediate needs. This tendency, characteristic of many African countries is due to the lackluster socioeconomic context that exists in these countries. The question to ask is do the satisfaction of certain needs is a prerequisite for protecting the environment.

Another important point emerges from our results: the link between anthropomorphic and ecocentric conceptions. This correlation was observed in adult teachers, and merits to be more investigated, including Togolese children: is it useful to promote anthropomorphism at school, through game-plays, stories, or through a valorization of the traditional animism? Nevertheless this anthropomorphism can be also a danger, an obstacle to learning some scientific knowledge. This discussion opens the interest for further investigations.

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