



Teacher Education and Popular Culture: Proverbs about the Climate and Weather

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ABSTRACT

Proverbs are a part of cultural heritage of people. Proverbs about climate and weather influence human behaviours at such areas as agriculture and fishing. The pedagogical use of proverbs promotes to link everyday knowledge with scientific one. However, teachers should be familiar with the meanings of proverbs to integrate them into their classes. This article presents data collected from prospective teachers (n=22) and senior citizens (n=38). The results show that both of the groups believed proverbs, even though there were some differences concerning their familiarities with the content of the proverbs. This shows that the proverbs should be successfully used in science teaching to facilitate a better conceptual understanding of science content. Therefore, proverbs should be approached in teacher education contexts.

Keywords: Popular culture, prospective teachers, proverbs, senior citizens, weather.

INTRODUCTION

Little information has been available for the exact origin or complete history of proverbs (Alves, 2006; Mieder, 2004; Parente, 2004) even though they have eventually passed from generation to next generation and arrived at the present time (Stone, 2006; Xacara & Succi, 2008). This sustainability of the proverbs may result from their usefulness, applicability and relevance in various situations/ages (Diaconu, 2017; Stone, 2006). Onofrei and Iancu (2015) view proverbs as an influence on teaching people even in the digital age.



Probably proverbs may emerge from a need for explaining or predicting an issue/phenomenon (Lauhakangas, 2007). Also, they may appear from inferences based on people's or entities' behavioural observations in their natural settings (Kim, Vaswani, Kang, Nam, & Lee, 2017; Lauhakangas, 2007). Hence, the existence of the proverbs reflects popular wisdom about the nature, climate and state of the weather (Diaconu, 2017). Further, they focus on religious issues, and deal with attitudes, behaviour and common sense of matters.

Despite the rapid advancement of science and technology, the proverbs about the climate and weather have still influenced human behaviours of agriculture, fishing and other economic activities (Diaconu, 2017). Furthermore, because the proverbs underpin (repeated) observations of phenomena, happenings and behaviours (Kim, Vaswani, Kang, Nam, & Lee, 2017), they can migrate from their original regions to another region without losing their meanings (Alves, 2006; Funk, 2009; Mieder, 2004). Therefore, proverbs express commonly accepted truths (Stone, 2006), which contribute to their persistency. However, their features of commonly accepted truths make them problematic since they convey 'unquestionable truths' that lead to the perpetuation, for example; of the submissive role of women (Mpungose, 2010).

Besides, the co-existence feature of the proverbs somewhat makes advanced scientific knowledge problematic since schools need to succeed in their missions of scientifically accepted knowledge. However, proverbs drawn from the students' cultural contexts help them understand science concepts (Mutonyi, 2016). Besides, an appropriate pedagogical use of proverbs allows students to understand the strengths and limitations of these two cultures - scientific culture and everyday life culture (Diaconu, 2017). Then, they are able to decide about which of the cultures is needed to use at any given moment.

Nevertheless, this requires teachers to know the proverbs, their meanings and how to pedagogically value and integrate them in their classes (Nkosi, 2016). This is important because teachers may conceptualize the association of science with daily life as meaning that scientific knowledge should be transferred to everyday context(s) instead of perceiving it as requiring the adoption of a daily life context-based learning approach (Çepni, Ülger, & Ormanci, 2018).

To train teachers concerning pedagogical advantages of proverbs, science educators need a deep understanding of how citizens, school science, and science teachers accept, understand and apply proverbs to everyday situations (Arreguín-Anderson, & Ruiz-Escalante, 2018). Thereby, the current study would highlight all stakeholders about how to handle the proverbs within science teacher education programmes.

PURPOSE

The purpose of this research was to find prospective primary school teachers' familiarity with proverbs referring to climate and weather, used in the northern Portugal and known by senior citizens or old people. The current study analysed the extent to which prospective primary school teachers knew proverbs, interpreted them according to their traditional meanings, and believed these proverbs. It purposed to get some insights on whether prospective primary school teachers' feelings towards the proverbs were similar to those of senior citizens living in the same geographic area. Overall, the current study is unique to provide invaluable results for teacher educators to train prospective teachers about the importance and potential of popular culture. Further, it would help them design locally contextualized teaching strategies to make science more meaningful and to integrate everyday culture (Haristiani, Aryanti, Nandiyanto & Sofiani, 2017) or knowledge (Sumarni, Sudarmin, Wiyanto, & Supartono, 2016) or scientific knowledge (Hewson, 2017) into scientific culture and school science.

BACKGROUND OF THE STUDY

The concept of the proverb

Although a layperson acknowledges various designations as synonymous with proverb, language scholars find some of them similar to proverbs (Xacara & Succi, 2008). In other words, some of them are quite different from proverbs. For example; some phraseologies like mockery, maxims and witticisms distance themselves from proverbs, because they contain malicious, satirical and vulgar features, respectively. Also, some ‘synonyms’ are unmistakable with proverb. For instance; superstitions, which concern a popular belief related to legends and idiomatic expressions, do not represent a universal truth. Furthermore, most of them is structurally constituted by incomplete statements or parts of statements (e.g., ‘to have somebody standing on the throat’), while proverbs are complete phrases. Other phraseologies like ‘saying, aphorism, precept and adage’ are only subtly different from the proverbs. In view of Xacara and Succi (2008), the adage, which especially differs from the proverb, does not involve a metaphor. Metaphoric characters of the proverbs confer their capacities of creating strong mental images and motivation for action or decision-making (Arreguín-Anderson & Ruiz-Escalante, 2018; Diaconu, 2017; Malunga & James, 2004).

The thin demarcation line between proverbs and other phraseologies has led authors to avoid a clear definition of the concept of proverb and minimize the risk of an incomplete and/or unsatisfactory definition of this concept. Vellasco (2000) made a suggestion for this difficulty. That is, proverbs should be regarded as a general class, eventually including subclasses (i.e., analogy).

Although some authors (e.g., Parente, 2004; Stone, 2006) have listed several thousands of proverbs in alphabetical order, others (Alves, 2006; Funk, 2002) have proposed systems for categorising them via different criteria. For example; such criteria focus on the subject (e.g., proverbs about climate, sea, water, agricultural) or the month of the concerned year or the region (e.g., continent, country, locality). Yet, collecting and/or cataloguing proverbs appears various versions of the same proverb(s) in different nations (Syzdykov, 2014) and even in the same nation (Stone, 2006). In spite of these difficulties, the author highlighted the importance of developing collections of proverbs (which include more ancient and more recent proverbs) that constitute an informative source about different cultures.

In summary, it can be stated that proverbs

“reveal popular wisdom and perpetuate it thanks to individual and collective spoken memory. Though still much less identified and identifiable, they are guaranteed, on the one hand, by the immensity of the different wordings of proverbs, and, on the other hand, by the popular spontaneous sensitivity, which in a particular and curious way renews and recreates them and encounters forms of regular use, which inspires great expressiveness and power to their manner of thinking and speaking and adopting these without any shyness and worries like rules and regulations.” (Urbano, 2008, p.43).

The school and proverbs

The school has a key mission to help students understand and adopt scientific culture. To succeed in doing so, the school need to find proper ways for helping their students move from everyday culture to scientific culture or distinguishing these two cultures from each other. Hence, they are able to choose the culture that they see as the most useful (Jegade & Aikenhead, 1999). Everyday culture, called popular culture, includes knowledge from observations, life experiences and social practices in the socio-cultural and geographic context(s) (Khusniati, Parmin & Sudarmin, 2017). People use this knowledge in their daily lives in favour of their life qualities.

The culture of daily life may contain general knowledge components (i.e., common sense), and components with local validity revealing the particularity and diversity of the groups. The scientific culture, which is universal, involves in scientists' characteristically knowledge, procedures, attitudes and ways of thinking and communicating. Although the school has the mission to pass on this culture, it only manages to convey the school science culture (Jegede & Aikenhead, 1999) including scientific knowledge re-interpreted by curriculum developers. Further, teachers should adapt them into their targeted populations and their well-defined characteristics. Even though the school culture seems to coincide with scientific culture, they will practically differ from each other to some extent.

In view of Lima (2012), it is possible to articulate (inside and outside of the classroom) knowledge about the aforementioned different cultures without asking students to replace their own world visions (i.e., characteristics from their own everyday culture) with scientific culture. However, these two cultures should interact with each other for achieving a mutual enrichment. Also, students need to understand that each type of knowledge has its own specific context(s) and application(s) (Lima, 2012). If school succeeds in doing so, then it is possible to learn science without having to abandon their original culture.

Proverbs have a greater impact than the simple words they encompass. People use proverbs to give their children lessons in morality or provide advice for them or call their attention to an important issue. Besides, proverbs, which have a didactic potential, are an instance of everyday (popular) culture which shares a feature with school culture: both of these cultures result from ways of conceiving the world (Sá Júnior, 2012). Hence, proverbs can help students cross and separate their borders with popular culture and school culture (Jegede & Aikenhead, 1999; Mutonyi, 2016). A consequence of this is that they can facilitate the transition between family and school cultural environments (Abubakar, 2011). Grant and Asimeng-Boahene (2006) argue that the African proverbs should be used in urban schools to attain 'education for citizenship' that maintains alive African culture and stimulates students' awareness of local and global issues. Also, teachers should be attentive, because the meanings of proverbs can vary from one locality to another (Dei, 2014). Since different communities re-interpret them (Syzykov, 2014), they are generally adjusted to local realities. For this reason, the use of proverbs needs to be contextualised (Abubakar, 2011).

Jackson (1995) argued that proverbs about environmental questions could be used in classes to promote the integration of new knowledge into students' cognitive structures. A few years later, Ibanez (2002) showed how to relate and use proverbs for teaching a chemical phenomenon. On the same theme, Asimeng-Boahene (2014) discussed that proverbs could be a powerful tool to promote education for citizenship. That is, the proverbs can lead students not only to think about their previous knowledge but also to develop critical thinking through cultural and social issues. Besides, in view of Malunga and James (2004), by adding humour proverbs can facilitate communication and reduce tension. Some authors plead for the use of popular culture (Sá Júnior, 2012) including proverbs (Aboluwodi, 2014; Mutonyi, 2016) that help students recognise their own historical and cultural values. Such a way reduces the marginalisation of local cultures and promotes indigenous education. Yet, Abubakar (2011) stresses that there are two types of African proverbs: those that instigate calm and reflection, and promote the link between the traditional and modern cultures; and those that, unhappily, incite haste and violence. So, teachers need to carefully select the proverbs to obtain the maximal educational potential and contribute to the affirmation of an African identity.

In brief, school knowledge should be consolidated on the basis of inquiring and discussion that make individual construction of new knowledge viable. "Proverbs can contribute to produce educated and well-integrated members of society, who can grow up with good morals and humanity values" (Nkosi, 2016, p.108).

Research about the potential and pedagogical use of the proverbs

A valuable pedagogical use of the proverbs requires that teachers and students should not only be familiar with the proverbs relevant to the subject under consideration but also succeed in interpreting them in an appropriate manner. However, the proverbs may be neither popular in rural areas (Kim et al. 2017) nor equally understandable for all age groups (Uekermann, Thoma, & Daum, 2007). Old people tend to know more proverbs and interpret them in a more straight relationship with concrete situations than do youngsters. Yet, the relationship between age and proverb knowledge may not be a linear issue. In fact, a study by Mendes, Funk, and Funk (2006) showed that age groups lower than 45 years old and over 65 years old knew fewer proverbs than the age group between 45 and 65 years old. Also, they noticed that there was no relationship between literacy level and proverb knowledge. Further, they elicited that the feminine gender (with their greater communicative competences) showed more familiarity with proverbs than did the males. This means that understanding the proverbs depends on the familiarity with the nouns since the proverbs with abstract nouns are more difficult to grasp (Nippold, Allen, & Kirsch, 2000).

Faria (2010), who analysed the occurrence of the Portuguese proverbs in mass media, reported that the proverbs mostly appeared in regional newspapers with a more conservative character as compared with national ones.

Chacoto (2011), who analysed the similarities and differences between meteorological proverbs used in diverse Portuguese-speaking areas (the Algarve - the southern part of the Portuguese mainland, the Portuguese Azores islands and Brazil), found that these proverbs were specific to a given region. Also, Chacoto (2011) depicted that some identical proverbs appeared for atmospheric phenomena in different regions.

Amaral (2014), who examined the agronomical basis of proverbs related with farming activities, noted that most of them possessed valid knowledge and coherent actual agricultural science. He also implied that they conveyed a direct message without any margin for subjective interpretations. However, he noted that this direct message did not happen for some analysed proverbs on the relationships amongst weather, farming processes and land cultivation. Nevertheless, Folhes and Donald (2007), who investigated the traditional prediction methods of the weather and climate, addressed that the farmers of Ceará (Brazil) continued to resort to predictions based on popular proverbs about the weather, before making decisions about agricultural processes and cultivating the land.

More recently, some researches have enquired the pedagogical potential of proverbs (e.g. Adeyemi & Salawudeen, 2014; Dei, 2012; Mieder, 2004; Yellin, 2012) and characterised their use within pedagogical contexts (e.g. Adeyemi & Salawudeen, 2014; Dei, 2012; Lima, 2012). The use of proverbs in the classroom context(s) enriches students' cultural knowledge (Brosh, 2013; Yellin, 2012), promotes the development of inter-cultural competencies (Brosh, 2013; Yellin, 2012), elaborates knowledge construction (Arzani, 2013), develops a critical attitude concerning various subjects (Brosh, 2013; Kovalski, Obara, & Figueiredo, 2009), improves competencies of communication (Mieder, 2004; Syzdykov, 2014), contributes to students' learning motivation (Arzani, 2013) and promotes an understanding of the relationship between traditional knowledge and scientific knowledge (Lima, 2012). Maia and Maia (2010) suggest that proverbs can be employed as a practical teaching approach that takes into account the historical, cultural and social contexts. They also argue how to plan activities about the relationship between weather and climate and forecast. For example; the use of the proverbs on the countryside (e.g., observation of clouds) is recommendable to develop competencies of observation, interpretation and prediction through forecast.

Faria (2010), who investigated primary and secondary students' knowledge of some Portuguese proverbs, reported that majority of them knew the proverbs. Furthermore, he

denoted that there was no great difference between urban and rural students' knowledge of the proverbs. In a similar vein, Kim et al. (2017) stated that old people and Korean university students' knowledge of the proverbs were almost the same. These authors also concluded that learning traditional ecological knowledge via traditional proverbs enhances urban students' eco-literacy especially when it is complemented with field-based observations.

To sum up, despite some variability in geographical terms and inconsistency with scientifically accepted knowledge, the proverbs present various didactic potentials. Besides, proverbs can be used in a formal science classroom to help students cross the border between everyday and scientific cultures. Hence, such a way enables them to understand the related phenomenon without threatening their worldviews or life cultures (Aikenhead, 1996; Jegede & Aikenhead, 1999; Mutonyi, 2016).

METHODOLOGY

Fifteen proverbs about the climate and weather were selected among those that appear, simultaneously, in two books (Alves, 2006; Parente, 2004) and three websites of Portuguese proverbs, namely Portal da Literatura (<http://www.portaldaliteratura.com/proverbios.php>), Provérbios Populares Portugueses (<http://proverbios.aborla.net/>) and Provérbios Populares Portugueses – Sabedoria Popular Portuguesa (<http://proverbios-populares.blogspot.pt/p/c.html>). The topic, which was of interest in daily life, deployed the proverbs to forecast on specific issues. In choosing the proverbs from the five information sources (i.e., conventional (books) and modern (websites) sources), the author(s) paid more attention to select well-disseminated proverbs and therefore likely to be familiar for people at different literacy levels. The selected proverbs were presented to 38 senior citizens drawn from 45 year olds and above through a convenient sampling method. The author(s) hypothesized that they would know the proverbs better than youngsters. They were asked to depict their familiarity with the aforementioned proverbs. Over half of them stated that they knew ten of these proverbs. These proverbs (see Table 4) were then chosen for this research. Since proverbs are metaphorical and literary statements, they can hardly be faithfully translated (Syzdykov, 2014). Therefore, the Portuguese version of the proverbs and their meanings as described in the literature were given in Appendix. The questionnaire included the following issues: participants' beliefs of proverbs, proverbs about the weather and climate, and weather forecast; the meanings of the selected proverbs about the climate and weather; and their beliefs of each proverb. The questionnaire used for data collection consisted of multiple-choice questions, each one followed by a request to explain the choice made. A group of experts (three science educators) checked the content validity of the questionnaire and ensured that the questions were consistent with the intended objectives. Besides, the questionnaire was pilot-tested with three senior citizens and three prospective teachers. This pilot-test indicated that senior citizens could not be familiar with the term provérbio (proverb) and therefore a synonymous (ditado popular that is, popular saying) was given.

The senior citizens and prospective primary school teachers were invited to participate in the study and answer the foregoing questionnaire. Thus, the study consisted of 60 participants from senior citizens and prospective primary school teachers. Senior citizens possessed different levels of formal education, varied personal and professional experiences. Prospective primary school teachers, who attended a Masters course concerning initial teacher training, held a first degree in a three-year basic education programme (see Table 1).

Table 1. *Demographic features of the participants*

Variable	Category	Prospective teachers (%)	Senior citizens (%)
		(n=22)	(n=38)
Gender	Female	77,3	63,2
	Male	22,7	36,8
Age	20 to 25	86,4	-
	26 to 30	13,6	-
	31 to 40	-	-
	41 to 50	-	5,3
	51 to 60	-	21,1
	61 to 70	-	18,4
	71 to 80	-	36,8
	81 to 90	-	15,8
	More than 90	-	2,6

As seen from Table 1, the groups (senior citizens and prospective primary school teachers) had about a 20-year age difference. Namely, the oldest prospective teacher was 28 years old, while the youngest senior citizen was more than 45 years old. In this case, it was expected that the senior citizens would know more proverbs than the prospective teachers. Furthermore, because both of the groups included more women, the gender would play an important role in communicative skills. However, this paper did not handle an analysis of the data within the gender. Data were exposed to content analysis based on a posteriori sets of categories. Two of the authors separately categorized and analysed the data. Afterwards, to check inter-rater reliability, a provisional comparison was done. Any discrepancy was solved through negotiation among three of the authors. Percentages were computed to facilitate comparisons of the groups.

FINDINGS and DISCUSSION

Prediction of the weather: meteorologists versus proverb predictions

All participants indicated that they were interested in knowing about the weather forecast. For this purpose, the prospective teachers tended to search the Internet (particularly to the website of the Portuguese Institute of the Sea and Weather), while senior citizens seemed to prefer television and radio (see Table 2).

Table 2. Participants' informative tools about the weather forecast

Tools	Prospective teachers (%)	Senior citizens (%)
	(n=22)	(n=38)
Television	18,2	71,1
Internet	100,0	15,8
Radio	-	26,3
Mobile phone	13,6	2,6
Newspapers	-	2,6
Proverbs	-	2,6
Observation of the sky at night	-	5,3
No response	-	2,6

Note: Some participants mentioned more than one option

This result is consistent with the fact “the internet is less used in Portugal as compared with the European countries” (European Commission, 2018). Furthermore, this result supports the idea “the use of the internet decreases with age” (Pordata, 2017).

As can be seen from Table 3, most of the prospective teachers (86,3%) depicted that meteorologists got the weather forecast right while some of the senior citizens (31,6%) answered that meteorologists often or always/almost always got it right.

Table 3. Participants' opinions on the probability of the meteorologists correctly predicting the weather

Frequency of correctness	Prospective teachers (%) (n=22)	Senior citizens (%) (n=38)
Never/ almost never	-	-
Sometimes	13,6	68,4
Often	54,5	18,4
Almost always/always	31,8	13,2

Their reasons to justify the role of the meteorologists in the weather forecast were different. Majority of the prospective teachers (86%) explained that the meteorologists possessed knowledge and technologies to make good predictions. This means that the prospective teachers seemed to recognise and value science and technology. On the other hand, about 68% of the senior citizens, who considered that the meteorologists sometimes got it right, focused on the ideas “only God could make correct predictions” (26,3%) and “the climatic changes have made it difficult to predict the state of the weather” (23,7%). The remaining justifications were quite varied. Some of them (e.g., “The weather forecast is an estimate subject to errors”) were repeated in different response categories (i.e., sometimes and often categories). Furthermore, over 80% of the participants said that they believed proverbs about the climate and/or weather. Some participants, who did not believe proverbs, gave a reason that the climate variation over time made it hard to make accurate predictions. The participants, who believed proverbs, simply asserted the idea “proverbs are almost always right”. They also added that the proverbs based on popular wisdom and repeated observations had been developed over time, a result that is in line with what some authors (e.g., Stone, 2006; Kim et al., 2017) had noted before. However, more than half of each group considered that the meteorologists made more certain predictions. None of the prospective teachers viewed that the proverbs would be more accurate than the meteorologists, whilst 26,4% of the senior citizens denoted that the proverb-based weather forecasts were more correct than did the meteorologists. The fact that over 55 years old citizens may be less interested in science than younger ones (European Commission, 2013) may have resulted in the difference between the senior citizens and prospective teachers.

Familiarity with proverbs about the weather

As mentioned earlier, at least half of the senior citizens was familiar to the proverbs selected for this research (see Table 4). Except for two proverbs (G and H), the prospective teachers had little information and/or familiarity about them (see Table 4).

As seen from Table 4, the percentages of the senior citizens, who agreed with the proverbs, were similar to those knowing them. The percentages of the senior citizens, who knew only two proverbs (G and H), were higher than those believing each proverb. On the contrary, the percentages of the prospective teachers, who were informed about the proverbs, were lower than those believing them under the question, except for proverb G. This may stem from an age-caused difference as stated by Uekermann et al. (2007).

Table 4. Participants' familiarity and agreement with the weather proverbs

Proverbs	Prospective teachers (%)		Senior citizens (%)	
	(n=22)		(n=38)	
	Knows	Agrees	Knows	Agrees
A - In March, rain on the roof during the morning and the bee comes out in the afternoon	-	40,9	78,9	81,6
B - North wind, three days strong	9,1	18,2	52,6	50,0
C - Winter in March and dry in April leaves the farmer begging	4,5	95,5	73,7	73,7
D - Year with snowstorm, year of bread	-	36,4	78,9	76,3
E - Good is the snow that comes at the right time	-	68,2	78,9	76,3
F - A high sea without wind does not promise safe weather	4,5	18,2	50,0	50,0
G - After the storm comes calmness	100,0	81,8	97,4	81,6
H - Seagulls on land, storm at sea	68,2	68,2	86,8	71,1
I - Neither in August go for a walk nor in December go for a sail	4,5	40,9	76,3	81,6
J - Wind against tide, raises the sea immediately	4,5	63,6	57,9	55,3

A high percentage of the participants knowing proverb G for both groups may come from the origin of the difference between the proverb G and the rest of the proverbs. Also, a few respondents had transposed this proverb to particular familiar situations, whilst a few of them concluded that good things (e.g., calm) did not always follow bad events (e.g., storm).

Both groups, who knew a proverb, generally agreed with it. Although some of them confirmed that they did not know certain proverbs, they were supposed to be overlooked. Half or more of the senior citizens stated that they did not know a given proverb; however, they did not say whether they agreed with it. In fact, the majority of the prospective teachers did not know the proverbs C, E and J but said that they agreed with them. For two other cases (proverbs F and H), most of them, who did not know the proverbs, did not mention about their agreement or disagreement about them. Also, their opinions to the remaining cases fell into the categories "agree, disagree and unanswered". Whatever they knew a given proverb, the participants were independently invited to interpret the proverb. Their interpretations were classified under four categories: appropriate (App) answer, including consistent interpretation with that of subject-specific experts (i.e., specifically, Alves 2006; Amaral, 2014); literal (Lit) answer including a translated interpretation to the content of the proverb; opposite (Opp) answer containing an opposite interpretation to the one acknowledged by the specialists (i.e., scientifically accepted answer); or no response (NR) incorporating an unsupplied or incomprehensible interpretation.

Consistently with Mendes et al. (2006), there was not a clear tendency for the claim the percentages of the senior participants that appropriately interpreted the given proverbs were higher than those of the prospective teachers (see Table 5). The prospective teachers had the highest percentages for the proverbs A and G while the senior citizens possessed the highest percentages for the proverbs A, D and G. Even though the proverbs A and G were concerned with the weather forecast, they had a different applicability. That is, the proverb A requested to predict the weather in March; the second concerned with a misfortune. Although climatic changes have led to a typical March in Portugal (IPMA, 2018), the participants tended to interpret this proverb based on their individual experiences, as it was found in previous research studies (Nippold et al., 2000; Stones, 2006).

Table 5. Participants' interpretation levels of the weather proverbs

Proverbs	Prospective teachers (%) (n=22)				Senior citizens (%) (n=38)			
	App	Lit	Opp	NR	App	Lit	Opp	NR
	A - In March, rain on the roof during the morning and the bee comes out in the afternoon	90,9	-	-	9,1	76,3	10,5	-
B - North wind, three days strong	4,5	72,7	-	22,7	-	63,2	-	36,8
C - Winter in March and dry in April leaves the farmer begging	13,6	81,8	-	4,5	34,2	52,6	-	13,2
D - Year with snowstorm, year of bread	22,7	4,5	36,4	36,4	92,1	-	-	7,9
E - Good is the snow that comes at the right time	4,5	72,7	-	22,7	7,9	84,2	-	7,9
F- A high sea without wind does not promise safe weather	-	59,1	-	40,9	-	31,6	-	68,4
G - After the storm comes calmness	100,0	-	-	-	97,4	2,6	-	-
H - Seagulls on land, storm at sea	9,1	90,9	-	9,1	65,8	26,3	-	7,9
I - Neither in August go for a walk, nor in December go for a sail	-	63,6	-	36,4	18,2	72,7	-	9,1
J - Wind against tide, raises the sea immediately	39,5	42,1	-	18,4	23,7	47,4	-	28,9

Furthermore, there are dozens of proverbs equivalent to this one (see the blog *Do Tempo da Outra Senhora at the link <https://dotempodaoutrasenhora.blogspot.com/2011/02/proverbios-de-marco.html>*). For example; “March, rough March, in the morning Winter, in the afternoon Summer” or “March, rough March, wintery mornings and summery afternoons” or “In March, each day it rains a little”. It is possible that the prospective teachers may have interpreted these proverbs by taking a day-to-day basis into account. The results of the proverb G may come from a daily used metaphor or the participants' practically familiar with its meaning. Besides, the participants included some versions of this proverb (see the websites about Portuguese proverbs entitled *Provérbios Populares Portugueses* at the link <http://proverbios.aborla.net/>). For instance, “Neither is there an evil that lasts forever nor a good that never ends”.

The Proverb D is closely linked to agriculture and more accurately to sowings of wheat. Appropriately over 90% of the senior citizens and less than a quarter of the prospective teachers interpreted this proverb (see Appendix). This may result from the prospective teachers' unfamiliarity with the propitious conditions for the germination of wheat grains. That is, nowadays little wheat sown has been existed in the northern Portugal. Similar case was valid for the proverb H associated with the state of the sea and implications for fishing. Namely, the prospective teachers may have not experienced this proverb in their daily lives. Perhaps, easily reading the literal terms may have resulted in such various responses as “When the seagulls flee to land, there is a storm at sea” or “When the seagulls flee to land, the sea is rough”. Rather than interpreting the behaviour of seagulls, as a sign of bad weather (and therefore a “warning” to fishermen), the participants interpreted the proverb as a consequence of a storm that had already happened or was happening. Indeed, fishermen would be of little use at this proverb. In fact, there are other versions (e.g., Seagulls inland are a sign of bad weather), which are more explicit in predicting the proverb.

Both of the groups obtained the highest percentages for three of the proverbs (C, E and I) under investigation. These participants may have not understood the metaphorical significance of the proverb limiting its reproduction. For example; the proverb C included such responses as “when it rains in March and it is very hot in April, the farmers are going

to have difficulties in growing their crops and fruits.” The proverb I contained such responses as “Since one cannot walk with the heat in August, bad weather makes impossible to go to sea in December.”

The proverbs B and F were problematic for both of the groups. That is, their responses were distributed with respect to the literal and the ‘unanswered’ response category. However, the former (literal) category was dominant for the prospective teachers (who comparatively risked more and responded), whereas the latter was the most frequent for the senior citizens (who comparatively tried more to avoid responding). The literal responses repeated the proverbs with slightly different words. For example; “Wind that comes from the north usually brings three days of a strong wind”. The proverb F is next to the proverb G; but it is less common and has more refined words than the Proverb G. Hence, this may stem from misunderstanding and/or deep interpretation of the aforementioned proverb. A sample response type is as follows: “When the level of the sea water is high and the wind is weak, the weather will be bad”.

The prospective teachers exceptionally gave an opposite meaning to the traditional meaning of the Proverb D. In fact, some of the prospective teachers believed that snow was bad for the sowing season and would be bad for the harvests. Further, they thought that people would not have anything to eat or enough money to buy food. Therefore, this means that they would have only bread to eat. Some sample ideas are in the following: “If it snows this year the output could be withered by the snow and there will be a scarcity of nourishment later on”; “If it snows a lot it withers the plantings and later on there will not be any other nourishment than bread to eat”. Even though Amaral (2014) emphasised that most proverbs related with farming activities possessed valid knowledge and conveyed a direct message without any margin for subjective interpretations, the prospective teachers (probably because they are not farmers) seemed to be unaware of the validity of this proverb.

CONCLUSION and IMPLICATIONS

In Portugal, lots of proverbs exist about the climate and weather. Some of them are specific to one region, while others have a generic character. This research focused on the generic proverbs related to the climate and weather. As expected, all participants were interested in the weather forecast; but they tended to use different information sources. Whereas the prospective teachers mostly resorted to the Internet, the senior citizens used more traditional communications. Moreover, the majority of the senior citizens and prospective teachers generally believed the proverbs, especially the proverbs of the climate and weather. Nevertheless, the prospective teachers believed that the meteorologists were more right at the weather forecast. This may result from the educational level of the prospective teachers, who had enrolled into higher education including scientific components. That is, they may have had more confidence to science and technology than did the senior citizens. In fact, our knowledge of the latter group indicates that most of the senior citizens did not have such an educational background.

Both of the groups, who knew a proverb, also agreed with it. But the senior citizens, who did not know a proverb, tended not to say their agreement or disagreement with it. Also, the prospective teachers were apt to say that they agreed with a proverb, even if they did not know the proverb. The prospective teachers were more predisposed to the interpretation of the proverbs that they did not know as compared with the senior citizens. This may come from the fact that prospective teachers’ developed interpretive competences and/or a high academic level; namely, in Portuguese language. Some of the prospective teachers and senior citizens focused on the literal sense of the proverb (i.e., metaphoric meaning) instead of making a deeper sense of it. However, such a limitation in

comprehending the proverb may have resulted in various formulas as it was emphasised by Urbano (2008).

Besides, there was no pattern concerning the appropriate interpretation of the proverbs in terms of the prospective teachers and senior citizens. However, this type of interpretation seems to depend on their familiarities with the subject or activity on which the proverb focuses, as could be anticipated based on Nippold et al. (2000). This supports the hypothesis that the senior citizens would show a better knowledge of the proverbs related with the certain areas of the activity (e.g., agriculture and fishing) than the prospective teachers, who were not acquainted with them. However, prospective teachers interpreted on of the proverbs in a way that differs from its usual meaning. This raises questions about how to pedagogically use the proverbs in science classes by adding an educational value.

It can be argued that even though teachers agree on multiple opportunities to address specific science objectives with the proverbs (Arreguín-Anderson & Ruiz-Escalante, 2018), knowing how to use the proverbs in the classroom is not enough for teachers to use them in a pedagogically valuable way. In fact, the prospective and in-service teachers need to understand the proverbs' origins and scopes, as well as their metaphorical natures. Also, they should appropriately select and/or use the proverbs in their classes given the characteristics of the school environment. Locally contextualized use of the proverbs (Abubakar, 2011) necessities to deal with everyday discourse that should be handled within teacher education (Arreguín-Anderson & Ruiz-Escalante, 2018). Analysing the meanings of proverbs involves in discussing the cultural, social and scientific relevance of the proverbs through their ethical and moral messages. Because the meaning of the proverb can vary from one place to another, to teaching with the proverbs methodologically requires them to be locally contextualised. In addition, how to use technology to make teaching and learning through proverbs more attractive to young people should be explored (Onofrei & Iancu, 2015). Fulfilling these conditions may contribute to Jegede and Aikenhead's (1999) views about the preservation of traditional culture, making school more attractive for students, and facilitating the integration of everyday knowledge into scientific knowledge. However, further studies should be undertaken to measure and/or examine the proverbs' potentials. Future studies should investigate how the locally contextualized proverbs act as tools to enhance students' interest in science, as well as how teacher educators can help prospective teachers to foster the integration of popular culture into school science.

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APPENDIX: Meaning of the Proverbs (Based on: Alves, 2006; Amaral, 2014)

Proverb	Meaning
A - In March, rain on the roof during the morning and the bee comes out in the afternoon (Em março, de manhã pinga a telha e de tarde sai a abelha)	In March the weather is unstable - both rainy and sunny. With the arrival of Spring the temperature starts to rise but sometimes it rains. When there is sun, this increases the temperature and allies to the humidity resulting from the rain. Favourable conditions appear for bees to collect pollen and nectar from the early blossoms (To collect them, the bees need heat and humidity).
B - North wind, three days strong (Vento norte, três dias forte)	The wind from the north delays its passing. In Winter the northern hemi-sphere affects winds from the north resulting from an intense and delayed advection of polar or even Arctic air that covers an extensive area of the Atlantic. So, the wind takes longer time to pass.
C - Winter in March and dry in April leaves the farmer begging (Inverno em março e seca em abril deixam o lavrador a pedir)	A wintery March (rainy and cold) and a dry April are bad for harvests. Generally, farming develops better at moderate temperature and rainfall. Abrupt climactic transitions during a short time interval make it difficult for plants to adapt physiologically, thus cause a harm for the farmer (which may request any help).
D - Year with snowstorm, year of bread (Ano com nevão, ano de pão)	A snowy or frosty year means good cereal harvests. The snow or frost that covers a winter sowing of cereal seeds (e.g., wheat or rye) provides the water for the grain to germinate in the interior of the soil (and the result is a higher output). The occurrence of moderate cold and snow can also stimulate the development of the plants, especially during the initial phases, which stimulates the good rooting and germination of the plant seeds.
E - Good is the snow that comes at the right time (Boa é a neve que a tempo vem)	The appropriate phase of the vegetative cycle of plants in cultivating cereals benefits from frost or snow. These elements greatly improve the resistance of plants, specifically, cereal crops to dryness, as they facilitate the penetration of the roots into the soil. Moreover, they promote the development of the plants, as, amongst other things, they carry fertilizers into the soil.
F - A high sea without wind does not promise safe weather (Alto mar e não de vento não promete seguro tempo)	High waves, which are apparently not associated with wind, mean that bad weather is coming. The undulation generated by frontal disturbances is observable before the disturbance itself. Very strong winds produce the disturbance. For this reason, these undulations indicate that a bad weather is approaching.
G - After the storm comes calmness (Depois da tempestade vem a bonança)	A bad thing does not last forever. A storm has a certain duration but it passes and is replaced with good weather. During the storm it is dangerous to be at sea (unless one can navigate properly), but after it ends, calm weather comes out. The same issue is valid for the ruinous things of life.
H - Seagulls on land, storm at sea (Gaiotas em terra tempestade no mar)	Having seagulls on the beach or near the sea means an impending storm at sea. The seagulls are unable to catch food in turbulent waters. For this reason, when the sea is agitated, they come to land to procure their sustenance. This behavioural function as a sign for fishermen meaning not to go the sea for fishing.
I - Neither in August go for a walk, nor in December go for a sail (Nem em agosto caminhar, nem em dezembro marear)	Everything should occur in the right weather. Because there are higher temperatures in August, go walking is inappropriate for this month. since December, a month of Winter, which is very cold, rainy and windy (which provokes maritime choppiness), going to the sea is inappropriate (especially, go sailing).
J - Wind against tide, raises the sea immediately (Vento contra a corrente, levanta mar imediatamente)	Any contradiction to a natural or normal case may cause problems. Normally waves travel in the direction of the wind. However, during a very deep depression, the wind blows to the opposite direction against the free waves. Such a case elevates these waves (i.e., it raises the sea), which provoke rough seas and are dangerous for seafarers.

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