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Published in:
Journal of Applied Animal Research

DOI:
10.1080/09712119.2019.1651728

Publication date:
2019

Document version
Publisher's PDF, also known as Version of record

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Citation for published version (APA):
Vargas-Bello-Pérez, E., & Hernández-Castellano, L. E. (2019). Practical and innovative solutions to overcome language barriers in veterinary and animal science education in the European Union. Journal of Applied Animal Research, 47(1), 429-432. https://doi.org/10.1080/09712119.2019.1651728
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To cite this article: Einar Vargas-Bello-Pérez & Lorenzo E. Hernández-Castellano (2019) Practical and innovative solutions to overcome language barriers in veterinary and animal science education in the European Union, Journal of Applied Animal Research, 47:1, 429-432, DOI: 10.1080/09712119.2019.1651728

To link to this article: https://doi.org/10.1080/09712119.2019.1651728

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Published online: 07 Aug 2019.

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Practical and innovative solutions to overcome language barriers in veterinary and animal science education in the European Union

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ABSTRACT
Academic mobility and cultural diversity have continuously increased in higher education in recent years. Consequently, the language barrier has become an important issue in the learning process, mainly in Europe where there are 24 official languages. In animal and veterinary sciences, the complexity of vocabulary used during the learning process exacerbates this problem. To overcome this problem, lecturers must create an interactive and engaging classroom atmosphere, provide a reduced and concise lecture and promote interaction between students through the promotion of discussion. The use of e-tools also contributes to student interaction. When teaching animal biological processes, hands-on laboratory exercises and case-based activities also help overcome language barriers between students and lecturers. Lecturers need to create an interactive classroom through the use of direct and concise language and new technologies to promote learning in international classrooms.

Introduction
Recently, higher education has become an important indicator of national economic competitiveness. Internationalization in higher education is commonly linked to the innovative response to external marketing opportunities (Kim 2009). Moreover, international recruitment of the best and most brilliant students and lecturers contributes to increased international recognition (Tripathi and Mukerji 2017). Consequently, academic mobility and cultural diversity have continuously increased in higher education institutions in recent years (Teichler 2015).

In the European Union (EU), several national policies have been developed to increase the mobility of students and lecturers and promote cooperation among European institutions; which led to the creation of the Bologna Declaration in 1999. This fact, together with liberalization of international higher education markets, enabled and stimulated the cross-border and free trade of educational services. Several studies have focused on student mobility in the EU (Aramburu 2017; Groves et al. 2018; McGrath and Frearson 2016). Similar studies on lecturers’ mobility in the EU are limited. In some countries such as Austria, Denmark, the Netherlands or Belgium foreign lecturers can represent a high percentage of academic staff. For instance, Danish universities have been to increase the number of foreign lecturers over the last decade as part of the internationalization strategy (Forskningsministeriet U-o 2014). International academic staff represents nowadays 30% of the overall teaching staff, including Assistant Professors, Associate Professors and Full Professors at Danish universities. Similar strategies to increase the number of international academic staff have been implemented at other European universities such as University of Tartu (Estonia, 12%), Wageningen University (The Netherlands, 13%), Ghent University (Belgium, 13%). However, these percentages are quite low compared to the percentage of international academic staff at the University of Austria (Austria), where they represent up to 70% of the total academic staff (information obtained from the reports published at each official university website).

According to Chugh (2017), the success of knowledge transfer in universities is often hampered by factors such as lack of resources, lack of peer trust, job insecurity, culture (personal and organizational), inadequate communication, lack of leadership, organizational politics and work overload. The negative effect of some of these factors (i.e. culture, inadequate communication, lack of leadership and work overload) on the success of knowledge transfer is often exacerbated by the use of a non-native language by lecturers or students (Henderson and Wellington 1998).

In the EU, there are 24 official languages, where only 13% of the total European population have English as the native language (Eurobarometer 2012). Soon, this percentage could be reduced if the United Kingdom leaves the EU. As shown in Table 1, in European universities located in countries where English is not the native language, English is often chosen as the language of teaching when either the students or the academic staff do not speak or understand the national language, especially at Master’s level.

The role of the lecturer is not only to transfer information, but also facilitate development of students’ ability to apply basic knowledge and gain higher levels of understanding...
(Kaisarevic et al. 2017). To accomplish these goals, lecturers must become facilitators who create a learning environment in which questioning, seeking, synthesizing, and discussing are encouraged (Fry et al. 2009). During didactic activities, interpersonal communication between lecturers and students should be orientated towards achieving educational objectives, through lecturers’ ability to produce an effect on students and organize learning activities. The issue of didactic communication and lecturers’ communication competence are subjects treated in numerous specialty papers, from the field of communication sciences to the field of psycho-pedagogy (Crista 2018). Therefore, the use of English by non-native English lecturers to teach non-English native students (e.g. native Spanish lecturers use English to teach native Danish students) is an important issue to be addressed during the creation and organization of a subject. Thus, the language barrier can be exacerbated in the veterinary and animal science fields due to the complexity of vocabulary used during the learning process. For instance, the use of either technical words (i.e. methylenedioxymethamphetamine, depolarizability, gluconogenesis), words rarely used in English (i.e. aliquot, supernatant, centrifuge, rumination) or technical concepts (i.e. fresh cow, dry cow, white veal) can challenge the transfer of knowledge from lecturers to students. Therefore, lecturers must develop practical and innovative educational strategies to overcome language barriers and provide a clear transparent flow of knowledge to their students. In this article, we suggest practical and innovative ways to solve linguistic problems between lecturers and students to promote the transfer of knowledge in European Universities.

Therefore, it is recommended that lecturers and students spend some time at the onset of the academic course to identify cultural similarities and differences, which will contribute substantially to the creation of an interactive and engaging classroom atmosphere (Devita 2000). Additionally, the creation of peer-pairing programmes for either lecturers or students can help overcome language barriers in a classroom. In this type of programme, international and national lecturers work together to facilitate understanding from both sides. This strategy is not only helpful for the international lecturer or student, but also for the host (Summers and Volet 2008). The host partner can help the international partner be familiarized with new environmental conditions (i.e. campus resources, lifestyles, official requested documents, grading system). On the other hand, this strategy could help the host in the future, if needing to work with a multicultural and multidisciplinary group of people (i.e. working for global enterprises).

### Reduced and concise one-way communication, increased understanding and learning

In an international classroom, both lecturers and students need to work together to overcome language barriers. Lecturers need to understand the use of non-specific terms such as metaphors, double meaning expressions or ambiguous expressions might cause misunderstanding in students (Jha 2017). Therefore, lectures should teach in a clear, slow, direct and concise way to facilitate student comprehension (Devita 2000; Ramburuth and Tani 2009). Additionally, lecturers should use body language to emphasize important statements (Teekens 2003). For example, exaggerated body movements, change of body posture or gestures can attract students attention to important concepts they will need to keep in mind for future discussions.

Lecture duration also affects attention level of students, particularly when lectures consist of long monologues (Song et al. 2019). This factor is even more important in an international classroom because students can suffer from language fatigue in the process of understanding what is being said, which further challenges them in their understanding of the topic (Devita 2000). Therefore, lectures based on monologues must be limited to short time periods and more learner-centred.

### Creation of an interactive and engaging classroom atmosphere

The creation of an environment that invites and encourage students to participate and contribute to their own learning is essential (Crose 2011). This situation can be affected when the teaching language is different from the mother tongue of either the lecturer or the student. Language affects students’ ability to understand, interact and learn with direct consequences on students’ confidence (Ramburuth and Tani 2009).

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Table 1. Top 10 European universities in veterinary and animal science education according to the 2019 Times Higher Education World University Rankings.

| University | Country | Number of students per staff | International students (%) | Bachelor | Master |
|------------|---------|-----------------------------|---------------------------|----------|--------|
| LMU Munich | Germany | 36.0                         | 16                        | German (100%) | German (100%) |
| Wageningen University | Netherlands | 20.9 | 29 | Dutch (85%) | English (100%) |
| Utrecht University | Netherlands | 14.3 | 7 | Dutch (100%) | Dutch (100%) |
| University of Helsinki | Finland | 16.6 | 6 | Finnish (100%) | English (100%) |
| Free University of Berlin | Germany | 56.4 | 21 | German (100%) | German (100%) |
| University of Copenhagen | Denmark | 4.4 | 16 | Danish (100%) | Danish (100%) |
| Aarhus University | Denmark | 14.8 | 11 | Danish (100%) | English (100%) |
| Catholic University of Louvain | Belgium | 39.6 | 21 | English (100%) | Dutch (100%) |
| Ghent University | Belgium | 35.2 | 10 | Dutch (100%) | Spanish (30%) Catalan (69%) English (1%) |
| Autonomous University of Barcelona | Spain | 12.8 | 16 | Spanish (50%) English (50%) |

*Excluding European universities located in countries where English is the official language (i.e. UK, Ireland)*

*Information obtained from the official website of each University.*
activities should be promoted in the classroom. As students engage in more active learning in classrooms, their reliance upon understanding the spoken word is decreased (Crose 2011). Learner-centred activities minimize language barriers and increase student learning (Devita 2000; Halic et al. 2009).

**Increased classroom interaction through the promotion of discussions**

As part of learning science, it is important for students to explore their own views and those of others to develop an independent way of thinking (Henderson and Wellington 1998). Lecturers must promote listening and talking between students, which in turn will increase constructive discussions and generation of new ideas in the classroom (Biggs 2012). However, due to cultural differences, language barriers, and cultural norms, participation in an international classroom is frequently lower than classrooms where lecturers and students share the same language (Leask 2009). Lack of participation can put additional distance between international students or between students and the lecturers, leading to increased cultural distance.

Several authors have described diverse strategies aimed at facilitating effective discussions in an international classroom. One of these strategies is based on using reduced (three or four people) multicultural groups for discussion activities. Those groups are intended to promote participation of students with language difficulties because they are less worried about expressing themselves incorrectly (grammar mistakes, wrong words) (Crose 2011). Therefore, this strategy does not only generate valuable discussions among group members; it also improves the communication skills of those with some difficulties. When these small groups are created, lecturers must ensure connections among groups to promote global discussion. Another strategy to promote classroom discussion is for lecturers to suggest some discussion topics in advance (e.g. upload topics in a virtual campus one week before class), so students can prepare some comments and answers in advance, which will increase student confidence and therefore participation in discussions (Macgregor and Folinazzo 2018). In both strategies, lecturers should acknowledge the new concepts or insights introduced by the student, so they can feel more comfortable participating in future discussions (Devita 2000).

The use of new technologies is another novel strategy to improve communication and interaction between students and lecturers; e-tools such as Glogster, Kahoot and Spreaker are examples (Serdyukov 2017). Electronic polling and quiz tools (i.e. Poll Everywhere, Socrative, and Kahoot) are alternatives to classroom response systems such as clickers. Lecturers can use polls or online/mobile quizzes to engage students throughout a discussion, keep track of attendance, and assess comprehension and attitudes of the group (Glendon and Ulrich 2005). Students can also compete in games in groups or alone for points. In the case of veterinary medicine teaching, polls or quizzes can be used for discussing case studies where students argue the diagnosis for a given clinical sign.

Another interesting option is to use digital game-based learning adapted to specific animal science concepts or veterinary medicine activities (Buur et al. 2013). For example, one of the most important basic processes to understand in animal science is the production stages of a cow. In this case, a digital game-based tool will help students to actively understand how cows change their physiological needs as production stages progress. When students are taught with a simple PowerPoint slide, concepts may not be fully understood, which will lead to subsequent misunderstandings in advanced courses (Schmaltz and Enström 2014) such as animal nutrition, animal physiology or animal endocrinology. Consequently, a digital game where students can fill out a diagram with real images and keywords of a cow’s production cycle will help greatly.

New technologies to improve learning and instruction are not intended to replace masterful teaching, but to complement it. In addition, given that ‘millennial’ students are digital natives and most lecturers are digital immigrants, a modern lecturer should be a learning designer rather than just the content expert and creator of a syllabus and PowerPoint slides (Lee et al. 2017).

**Assessment and evaluation based on the process are used to find the solution rather than the solution itself**

Student assessment and evaluation should focus more on the method and process used to find a solution rather than the solution itself (Edmundson 2006). For instance, problem-based learning is a teaching method in which complex real-world problems are used to promote student learning of concepts and principles (Hmelo-Silver 2004). Additionally, this strategy can promote development of critical thinking skills, problem-solving abilities, and communication skills and provide opportunities for working in groups, finding and evaluating research materials, and life-long learning (Duch et al. 2001). However, lecturers must be cautious when they include these type of activities in a multicultural classroom. Cultural contexts and language barriers can cause misinterpretation of directions by students (Harzing and Feely 2008). In these cases, lecturers should clearly define tasks, so students can apply acquired skills and knowledge to reach a solution. This type of activity does not only allow students to demonstrate the processes used to arrive at the solution, but it lets students apply their knowledge to real situations and problems (Russell and Airasian 2011). In animal and veterinary sciences, problem-based learning is perhaps the most useful teaching method. In this case, we can use two ways of learning that balance each other: hands-on laboratory exercises (HLE) and case-based activities (CBA) (Mcfee et al. 2018). For example, in farm animal reproduction, students may study semen evaluation by HLE whereas in CBA students can learn specific parameters of a real case to understand estrous cycle manipulation and synchronization. As another example, when learning about the cardiovascular system, students can use electrocardiograms as HLE proxy and then use specific electrocardiograms from a real case as CBA. Both HLE and CBA should be implemented together. They are a very interesting choice of evaluation that helps overcome language barriers when teaching complex biological process. Animal science students and veterinary medicine students have different academic backgrounds (Reiling et al. 2003). However, both groups of students need to achieve a
cognitive level where they are able to create arguments and diagnose, treat and conjecture about on-farm or in clinical situations needing a solution.

**Conclusion and recommendations**

This manuscript described different examples of teaching strategies that can be used in veterinary and animal science education to overcome language barriers and contribute to the creation of an interactive and engaging classroom atmosphere. The use of digital tools such as electronic polling and quiz tools is recommended to promote student interaction. In addition, hands-on laboratory exercises and case-based activities help overcome language barriers between students and lecturers when teaching complex biological process.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

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