



ESL Teacher Certification Policy: Current Trends and Best Practices

Christopher Gras1* and Christina Kitson2*

¹ Department of Teaching and Learning, College of Education, The University of Iowa, Iowa City, IA, United States, ² Department of English and Philosophy, College of Arts, Humanities, and Social Sciences, University of Central Missouri, Warrensburg, MO, United States

Utilizing aspects of the Standards for Initial TESOL Pre-K-12 Teacher Preparation Programs (2018), this study seeks to review and critique current trends in ESL teacher certification policy nationwide. Data collection involved triangulating state policies found online with a brief questionnaire sent to teacher certification boards nationwide (51 in total). The researchers focused on whether or not state policies: (1) offer initial and/or add-on ESL certification; (2) have a test-out option for add-on ESL certification; (3) require a certain number of credits for add-on ESL certification; (4) align their coursework topic requirements with guidelines set forth by TESOL. Data analysis highlighted changes in policy from a previous survey conducted during the NCLB era (Reeves, 2010), and compared requirements in each state's policy to the Standards for Initial TESOL Pre-K-12 Teacher Preparation Programs (2018). Findings reveal an alarming trend toward less rigorous add-on certification (i.e., endorsement) pathways as well as a number of states either no longer offering initial certification or providing options for testing-out of coursework altogether. Additionally, many state policies outline required coursework, but few follow ESL teacher preparation guidelines set by TESOL International Association (TESOL) (2019). This has led to a notable rift between current ESL teacher education policy and evidence-based best practices such as coursework on the linguistic and cultural aspects of second language learning.

Keywords: teacher certification, teacher education, English as a Second Language, language policy, teacher effectiveness

INTRODUCTION

The need for effective English as a Second Language (ESL) teachers in the United States K-12 system has never been greater (Coady et al., 2011). Surging ELL populations across the country have created a demand for qualified teachers that has yet to be satiated. Nationwide, there are over 5 million ELLs and a large number of them are taught by underprepared educators (Gándara et al., 2005). The meteoric increase in ELL student population combined with increasingly watered down ESL teacher education policies has left many states struggling to fill K-12 ESL vacancies with qualified and effective teachers (de Jong et al., 2013; Hamann and Reeves, 2013). This notable issue in state teacher education policy begins with the choices states make surrounding the ESL certification pathways they offer.

Every state in the country offers a distinct version of either an initial and/or add-on (i.e., endorsement or infusion) certification for ESL teachers (Reeves, 2010). Initial certification is a stand-alone primary certificate in ESL whereas an add-on certification means a teacher has or is in the process of obtaining certification in another primary area (e.g., elementary education, math, social studies, etc.) The problem is that add-on programs are shorter and less intensive than their initial certification counterparts. Add-on policies were originally created for already certified teachers and were not intended to be completed parallel to initial certification in a content

OPEN ACCESS

Edited by:

Cheryl J. Craig, Texas A&M University, United States

Reviewed by:

Katerina Plakitsi, University of Ioannina, Greece Karen La Paro, University of North Carolina at Greensboro, United States

*Correspondence:

Christopher Gras christopher-gras@uiowa.edu Christina Kitson kitson@ucmo.edu

Specialty section:

This article was submitted to Teacher Education, a section of the journal Frontiers in Education

Received: 05 August 2020 Accepted: 25 February 2021 Published: 17 March 2021

Citation:

Gras C and Kitson C (2021) ESL Teacher Certification Policy: Current Trends and Best Practices. Front. Educ. 6:591993. doi: 10.3389/feduc.2021.591993

1

area (Coady et al., 2011). They are typically completed in far fewer credits and some even lack a practicum and/or student teaching component.

The alarming brevity of ESL add-on certification programs leads to questions surrounding the effectiveness and efficacy of new ESL teachers (Coady et al., 2011). In many states, the depth of linguistic and cultural knowledge ESL teacher candidates obtain in add-on certification programs is relatively minimal (Darling-Hammond, 2006). This is directly linked to decisions made by teacher certification policy makers who overlook evidence and best practices from contemporary research (Croninger et al., 2007). Adding to this concern is the fact that many states do not require any form of previous experience or coursework in Applied Linguistics prior to seeking ESL add-on endorsement (Reeves, 2010). Having a foundation in Linguistics, second language learning, and sociocultural elements is necessary for ESL teachers who routinely work with students from diverse home backgrounds (Johnson, 2009; Reeves, 2009; Lantolf and Poehner, 2014). One reason to include this type of coursework is to address the concept that there is no right way to teach ESL, but rather a right way for a context based on historical and institutional perspectives on culture and language (Wertsch et al., 1995).

As many states water down their ESL teacher certifications, critiques surrounding the rigor of these continually revised policies must be presented. Although it is easy to attribute these concerns to rapidly growing ELL populations and a lack of certified teachers, it's clear that ESL educators and students have been historically marginalized by macro policies (Moore, 2007; Batt, 2008) and the status of ESL teachers in various contexts has to be discussed (Johnson, 2006). Thus, it has become increasingly important to examine the extent to which state-level ESL teacher certification policies are shaped by evidence-based standards such as those made available by TESOL. Having an accepted knowledgebase that is agreed upon for teacher education and can be used to create standards for credentials is necessary (Johnson, 2009). These concerns as well as a lack of recent literature on ESL teacher certification have led to the following questions about whether or not state policies: (1) offer initial and/or addon ESL certification; (2) have a test-out option for add-on ESL certification; (3) require a certain number of credits for add-on ESL certification; (4) align their coursework topic requirements with guidelines set forth by TESOL.

METHODS

Data Collection

Due to a wide array of different types of policy surrounding professional certification, parameters were set by the researchers to limit the forms of data collected. Data gathered for the study had to specifically address K-12 ESL teacher certification. This meant policy involving requirements for topics of study/courses, add-on certification credits, options for testing out, and educational background (e.g., language requirements, study abroad, and intercultural experience).

With parameters for data collection set, researchers identified the institutions responsible for teacher certification within each

of the states as well as Washington D.C. (51 total). Some states house all of their policies on one website, while other states have sites meant solely for teacher certification. If a state's K-12 ESL teacher certification policy was not digitally available, the state's Department of Education was contacted directly by email and phone to obtain it. A set policy was unavailable in some states for reasons explained in the results section.

Lastly, with policies in hand, the researchers contacted each state's Department of Education to confirm the recency and accuracy of each document. The purpose of this was to triangulate data, confirm all policies were up-to-date, and ensure additional documents were not available elsewhere.

Data Analysis

Initial data analysis was organizational in nature and began by placing relevant data into a display table. This table was divided into columns that aligned with the study's questions of inquiry. Each row was aligned with a different state and data were arranged into columns corresponding with initial/addon certification status, add-on certification credits, and test-out options for teachers who possess initial certification in other subject areas. See **Table 1** for an example of the data display.

After organizing these elements, a second table was created to compare each state's ESL certification policy with the Standards for Initial TESOL Pre-K-12 Teacher Preparation Programs (TESOL International Association (TESOL), 2019). TESOL's standards outline the content, pedagogical knowledge, and skills recommended for Pre-K-12 ESL teacher education policy and programs. They describe what TESOL candidates should know and be able to do upon completing their teacher education programs. The standards also set evidence-based guidelines for assessing candidates and measuring their preparedness for working with language learners (TESOL International Association (TESOL), 2019). Of primary interest to the present study are the five core standards:

- knowledge about language
- ELLs in the sociocultural context
- planning and implementing instruction
- assessment and evaluation
- professionalism and leadership

These central standards are further divided into 22 total descriptors (4–5 per standard) that explain what candidates should be able to achieve.

Analysis of the second table involved both *in vivo* (i.e., unaltered language from the data) and descriptive (i.e., summarized language) coding. Every step in the coding process was conducted independently by each researcher to triangulate codes and ensure consistency. Codes were then compared for similarities and any differences were resolved by a third party. The coding process began with researchers using *in vivo* coding to label the major topics within TESOL's standards and their descriptors. A codebook was then created to list each of the *in vivo* codes taken directly from language found in the data source (e.g., language, sociocultural, theory, instruction, methods, assessment, professionalism, etc.) Using this codebook, researchers searched for similar language in each state's ESL teacher certification

State	Initial certification	Add-on certification	Add-on # of credits	Test-out option
Alabama	Х	Х	30	Х
Alaska	X	X	18	Х
Arizona		Х	27	
Arkansas		Х	12	
California	X*	Х	12	Х
Colorado	*	Х	24	
Connecticut	Х	Х	30	
Delaware	Х	Х	15	
Florida	Х	Х	15	Х
Georgia	Х	Х	9	Х
Hawaii	Х	Χ*	30	Х
Idaho		Х	20	Х
Illinois	*	Х	18	
Indiana	Х	Х	15	
lowa		х	18	
Kansas		х	15	Х
Kentucky	Х	х	9	
Louisiana	*	X	12	
Maine	Х	X	15	
Maryland	X	X	21	Х
Massachusetts	X	~	21	X
Michigan	X	х	20/24**	~
Minnesota	X	X	32	
Mississippi	~	X	12	Х
Missouri		X	12	~
Montana	*	X	22	
Nebraska		X	15	
	*			
Nevada		X X*	12	
New Hampshire			34	
New Jersey	Х	X*	13	
New Mexico		X	24	
New York	X	X*	30	
North Carolina	Х	X	12	Х
North Dakota		X	16	Х
Ohio	Х	Х	24	
Oklahoma		Х	15	Х
Oregon	X*	Х	15	
Pennsylvania		Х	12	
Rhode Island	*	Х	18	
South Carolina	X*	Х	15	
South Dakota	*	Х	18	Х
Tennessee	Х	*		
Texas	*	Х	9	Х
Utah	X*	Х	18	
Vermont	Х	Х	18	
Virginia	X*	Х	24	
Washington	Χ*	Х	10	
Washington D.C.	Х	Х		
West Virginia	*	X		
Wisconsin	Х	X		
Wyoming	X*	X	27	

*Denotes change from previous study by Reeves (2010).

**24 semester hours for a K-12 endorsement and 20 semester hours for either a K-8 or 6-12.

policy. This process involved both scanning for the same *in vivo* codes, and using descriptive coding to find complementary language. Codes were then placed under the TESOL topics they were most similar to. After coding each state's policy in this manner, it was possible to determine the extent to which individual policies aligned with TESOL's standards. A matrix was created with states listed on the left column and the five primary standards above. Under each standard were the sub-codes that aligned with it. For example, knowledge about language was a primary theme with language theory, linguistics, language structures, SLA acquisition, etc. listed below it. Each state's row was then filled in with markers to denote whether or not their policy adhered to each of TESOL's standards.

RESULTS AND DISCUSSION

Research Question 1: Initial and/or Add-on Certification

Of the 51 state policies examined, 29 states offer an initial K-12 ESL teacher certification pathway. Initial certification is designed for pre-service teacher candidates interested in becoming ESL teachers. This pathway is typically more comprehensive and well-rounded in its breadth of educational coursework and field experience opportunities. The extensive nature of initial certification is due to an often-increased number of required credits as well as practicum and student teaching components. States that do not offer initial certification pathways in ESL position pre-service teachers who are interested in teaching ESL into either:

- pursuing initial certification in a primary area followed by add-on certification in ESL;
- obtaining initial certification in another state; or
- choosing another career

In many states, the former option has become a normalized route for ESL teachers. Obtaining initial certification in another field solely to teach ESL would be akin to a prospective science teacher needing initial certification in math before pursuing limited coursework in science. It makes little sense, but is accepted as the norm. Another finding related to initial certification involves a few states offering initial ESL certification options but not actually producing any certified teachers. The policies from these states are within a gray area as they either present no initial coursework guidelines for higher education institutions to follow, or solely provide initial certification to currently certified out-of-state ESL teachers. Since Reeves (2010) review of ESL certification policy, nine states have dropped their initial certification option, and seven states have added an initial pathway. This trend is likely due to an overall shift toward add-on ESL certification in policy.

Add-on Certification

In Reeves (2010) review, it is noted that add-on certification has become the primary and most popular form of certification in many states. This shift continues as the present study finds four additional states (Hawaii, New Hampshire, New Jersey, and New York) now offer add-on certification with one state (Tennessee) having dropped this option. This brings the total number of policies that have an add-on certification pathway to 49 with Tennessee and Massachusetts being the last remaining initial certification only states. Almost all of the states that are add-on certification only are located in the central part of the United States. It would seem these states are either copying the flawed certification policies of their neighbors or have similarities in other demographics or educational goals.

The original purpose of add-on certification was twofold. First, the add-on route provides an opportunity for experienced inservice teachers to teach in different content areas. For example, a certified elementary teacher could obtain add-on certification in ESL and swap to an ESL classroom. Secondly, content area teachers facing an increasing number of ELs in their classrooms could pursue add-on certification to better understand the needs of all of their students. The issue is that add-on certification in its current state is also available to pre-service teachers pursuing initial certification in other content areas. In some states, this means add-on certified pre-service teachers can begin their careers as K-12 ESL teachers in as little as three TESOL courses with no ESL-specific field experience.

A solution to this issue is to offer differing certification options for both in-service and pre-service teachers. Although there has been notable change to the specific states offering both initial and add-on ESL certification, the total number of states has remained static. Twenty seven of the 51 policies present K-12 ESL teacher candidates with the choice of pursuing their certification through initial or add-on pathways. Policies with both options are not necessarily more rigorous or comprehensive in nature. They are a step in the right direction though as they maximize the potential teacher candidate pool and are inclusive to those solely interested in teaching ESL.

Research Question 2: Test-Out Option for Add-on Certification

Test-out add-on certification presents the opportunity for ESL teacher candidates to obtain certification by passing a content knowledge test. Sixteen of 51 policies include a test-out option with most relying on the ESL Praxis test to determine a candidate's level of expertise. States using the ESL Praxis test can set their own cut-scores which range between 140 (Hawaii) and 172 (Alaska) with the most common being 155 (Kentucky, North Carolina, North Dakota). Many states only offer test-out options to experienced teachers or those who have taken additional ESL teacher education coursework. For example, Alabama requires candidates seeking test-out certification to have at least 2 years of full-time teaching experience. In states like North Dakota, up to 50% of recent add-on certification have been issued to candidates who test-out of traditional add-on teacher education programs. The concern here surrounds the constructs involved in the assessments being utilized to determine expertise. ESL content knowledge tests like the Praxis exam often emphasize linguistic constructs. This is partly due to the challenging nature of ascertaining one's cultural competence using solely test-based

formats. Additionally, states must determine a cut-score for test takers and the data shows a wide array of acceptable levels of expertise. The good news is that research has shown classroom experience can help bridge the gap for teachers who switch between subject areas (Reeves, 2010). However, more studies need to be conducted on the impact of teachers who bypass ESL coursework by way of testing-out.

Research Question 3: Credits for Add-on Certification

ESL certification requirements vary considerably from one policy to another. Part of this issue is due to a number of policies lacking details such as credit and topic requirements. Many policies such as those found in Arkansas, Connecticut, Florida, Louisiana, etc. have extremely brief ESL-specific guidelines that consist of a few bullet points. No written policy was publicly available in Mississippi, Montana, New Jersey, and North Carolina. In these states, ESL teacher education programs are typically approved by the state on a case-by-case basis. The lack of specificity found in many of these documents can lead to policies not being enacted as envisioned by policymakers. Additionally, the program quality from one institution to another may vary drastically. This is especially alarming with the rise in online certification programs that are often designed to certify candidates as efficiently as possible to maximize profits.

The majority of policies that list a credit amount for obtaining add-on certification require between 15 and 18 credits of coursework. The most lenient requirements can be found in Georgia, Kentucky, and Texas where teacher candidates only need 9 credits (roughly three courses) of coursework for add-on certification. In total, 12 policies (including D.C.) offer add-on ESL teacher certification in 12 credits or less. It should be noted that a few of these states, like California, require all content teachers who work with ELs to obtain ESL certification in the form of an endorsement or infusion. This explains the limited credit requirements in some states although additional research is needed surrounding the effectiveness and impact of this practice. On the other end of the spectrum are Alabama, Connecticut, and Minnesota where 30 + credits of coursework are required for add-on ESL certification.

Credit requirements alone do not correlate with the quality of a certification policy. Numbers can be deceiving as some policies count field experience coursework such as practicum or student teaching within their credit totals. A policy requiring field experiences in addition to 15 credits of coursework is very different from one requiring 15 credits of coursework including field experiences. Additionally, some policies allow teacher education programs to include elective coursework options. These options are often loosely related to the field and can include courses such as Latinx popular culture. Lastly, in addition to credits for ESL-specific topics, some policies have supplemental requirements for candidates. Nine states include foreign language requirements in their policies while others require evidence of exposure to cultural diversity (e.g., study abroad, language immersion, etc.) Foreign language requirements are advantageous as previous research shows a positive association between a teacher's foreign language

proficiency and their overall preparedness to teach ELLs (Coady et al., 2011).

Research Question 4: Course Topic Alignment With TESOL Teacher Preparation Standards

Only 13 of the 51 ESL teacher certification policies mention all five of the TESOL teacher preparation standards in some capacity. These standards include knowledge about language, ELLs in the sociocultural context, planning and implementing instruction, assessment and evaluation, and professionalism and leadership. Alabama, Hawaii, and Indiana effectively use TESOL's standards verbatim as their ESL certification policies. Colorado, Massachusetts, Michigan, Minnesota, New Hampshire, and Vermont all employ policies that parallel the evidence-based guidelines that TESOL provides. The policies from these states use their own language, and are notable for not only addressing each of the five standards, but doing so in a comprehensive manner. Arizona, Iowa, Missouri, and New Mexico do not have policies that are as detailed as those previously mentioned, but they are the only other states that cover all five of TESOL's recommended standards. 10 of the 51 policies mention three or fewer of these standards with Wyoming and New York only touching on two.

TESOL's five standards did not appear with the same frequency in the 51 policies. Every policy that listed required topics for certification included the standard of knowledge of language, as well as the standard of planning and implementing instruction. This is unsurprising as knowledge of one's content area and the ability to teach said content area are fundamental to becoming an effective educator. Sociocultural considerations were not far behind with only four states omitting components such as home culture, identity, and social aspects from their policies. 10 of the 51 policies did not mention any form of assessment, evaluation, or testing as a topic necessitating required coursework in ESL teacher education programs. This is surprising due to the special considerations that need to be made with assessing language learners and the frequency of testing that is conducted in the field. Finally, a mere 14 of 51 policies mention aspects of professionalism making it the least commonly seen of the five standards by far. This is problematic as leadership and advocacy is often highly desirable in language educators due to the vulnerable populations they work with.

CONCLUSION

To summarize, findings from the present study highlight a number of issues with the majority of current ESL teacher certification policies. First, the shift toward add-on certification initially identified by Reeves (2010) has continued. This is likely due to the popularity and succinct nature of these programs. In addition, many states not traditionally associated with ELLs are facing teacher shortages in this area and have attempted to fill their employment gaps as efficiently as possible. Second, the majority of ESL certification policies lack specificity surrounding topics of study and credit requirements. Ambiguity within policies can lead to divergent interpretations and disparities in the quality of ESL teacher education programs. The deficiencies present in state policies are likely linked to the historical marginalization of the field and the idea that ESL teacher expertise is superseded by generally recommended teaching practices (Harper et al., 2008). Lastly, only a small number of state policies align with the ESL teacher education standards set forth by TESOL. This is concerning as TESOL's preparation standards emphasize fundamental areas of knowledge for the field. English language educators ideally would be proficient in these areas, but at the very least should be exposed to them.

The authors also acknowledge the limitations and strengths of their research design. The primary limitation is connected to the ambiguity in how a minority of states outline and enforce their K-12 certification policies. These states (e.g., Georgia) do not officially list a credit hour requirement for their ESL teacher certifications. Instead, they approve teacher education programs on a case-by-case basis. Because of this, their credit and course requirements for had to be averaged by examining certification requirements from state-approved ESL teacher education programs. Another limitation of this study is temporality in that the data presented represents a snapshot in time and can quickly change from year to year based on the needs of districts within a given state. The authors of this study believe temporality is also a strength as these data offer an excellent foundation for future research on ESL certification policy. This study provides enough transparency, information, and rigor to more closely examine requirements for credit hours, course topics, second or foreign language prerequisites, and test-out options. The authors are hopeful that future studies will investigate these topics in more detail to obtain a better understanding of the connection between ESL policy and practice.

In closing, policymakers are urged to re-examine their ESL teacher certification policies. It is clear that policy changes must be made to ensure the expertise, quality, and efficacy of future ESL educators. The researchers suggest that comprehensive initial and add-on certification pathways be offered nationwide. When designing these pathways, policymakers should reference evidence-based practices and policy guidelines such as the standards presented by TESOL to ensure the best interests of ELL teachers and students alike. This would provide teacher education programs with an effective foundation to develop effective and consistent curriculum from one institution to another.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

CG conducted data collection and wrote the article. CK assisted with data collection, editing, revisions, and feedback on a number of occasions. Both authors contributed to the article and approved the submitted version.

REFERENCES

- Batt, E. G. (2008). Teachers' perceptions of ELL education: potential solutions to overcome the greatest challenges. *Multicult. Educ.* 15, 39–43.
- Coady, M., Harper, C. A., and de Jong, E. J. (2011). From preservice to practice: mainstream elementary teacher beliefs of preparation and efficacy with English language learners in the state of Florida. *Biling. Res. J.* 34, 223–239. doi: 10.1080/ 15235882.2011.597823
- Croninger, R. G., Rice, J. K., Rathbun, A., and Nishio, M. (2007). Teacher qualifications and early learning: effects of certification, degree, and experience on first-grade student achievement. *Econ. Educ. Rev.* 26, 312–324. doi: 10.1016/ j.econedurev.2005.05.008
- Darling-Hammond, L. (2006). Constructing 21st-century teacher education. *J. Teach. Educ.* 57, 300–314. doi: 10.1177/0022487105285962
- de Jong, E. J., Harper, C. A., and Coady, M. R. (2013). Enhanced knowledge and skills for elementary mainstream teachers of English language learners. *Theory Pract.* 52, 89–97. doi: 10.1080/00405841.2013.770326
- Gándara, P., Maxwell-Jolly, J., and Driscoll, A. (2005). Listening to Teachers of English Language Learners: a Survey of California Teachers' Challenges, Experiences, and Professional Development Needs. Santa Cruz, CA: Center for the Future of Teaching and Learning. Available online at: https://eric.ed.gov/ ?id=ED491701 (accessed August 15, 2020).
- Hamann, E. T., and Reeves, J. (2013). Interrupting the professional schism that allows less successful educational practices with ELLs to persist. *Theory Pract.* 52, 81–88. doi: 10.1080/00405841.2013.770325
- Harper, C. A., de Jong, E. J., and Platt, E. J. (2008). Marginalizing English as a second language teacher expertise: the exclusionary consequence of No Child Left Behind. *Lang. Policy* 7, 267–284. doi: 10.1007/s10993-008-9102-y
- Johnson, K. E. (2006). The sociocultural turn and its challenges for second language teacher education. *TESOL Q.* 40, 235–257. doi: 10.2307/40264518

- Johnson, K. E. (2009). Second Language Teacher Education: a Sociocultural Perspective. New York, NY: Routledge.
- Lantolf, J. P., and Poehner, M. E. (2014). Sociocultural Theory and the Pedagogical Imperative in L2 Education: Vygotskian Praxis and the Research/Practice Divide. New York, NY: Routledge.
- Moore, H. (2007). Non-language policies and ESL: some connections. *TESOL Q*. 41, 573–583. doi: 10.1002/j.1545-7249.2007.tb00089.x
- Reeves, J. (2009). A sociocultural perspective on ESOL teachers' linguistic knowledge for teaching. *Linguist. Educ.* 20, 109–125. doi: 10.1016/j.linged.2008. 11.001
- Reeves, J. (2010). Looking again at add-on ESOL certification. TESOL Q. 44, 354-364. doi: 10.5054/tq.2010.222216
- TESOL International Association (TESOL). (2019). Standards for Initial Tesol Pre-K-12 Teacher Preparation Programs. Alexandria, VA: Author.
- Wertsch, J. V., Del Rio, P., and Alvarez, A. (1995). "Sociocultural studies: history, action, and mediation," in *Sociocultural Studies of Mind*, eds J. V. Wertsch, P. Del Rio, and A. Alvarez (New York, NY: Cambridge University Press), 1–34. doi: 10.1017/cbo9781139174299.002

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2021 Gras and Kitson. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.