Exploring the impact of peer review on the development of engineering education researchers

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Structured abstract

CONTEXT
Peer review has been the focus of an ongoing study at the last three conferences of the Australasian Association for Engineering Education (AAEE). A further development of this study has been to explore the perspective/s of the authors of these conference papers and the impact that peer review had on their development as researchers. Brew (2001, 2006) reports on the different ways that academics conceptualise their research and tells us that the way academics think about their research is strongly linked to their identity. McAlpine and various colleagues have proposed an identity-trajectory framework to describe the development of academic identity. This framework consists of three intertwined strands: intellectual, networking, and institutional, which interact over time to support or constrain an academic's development.

PURPOSE
In this paper we report using the notion of intertextual networking, part of the identity-trajectory framework, as a lens to explore the relationship between peer review and academic identity construction for engineering education authors in the AAEE community.

APPROACH
Semi-structured interviews were conducted with nineteen 'active' members of the AAEE community. Participants were asked questions relating to their conference paper, and the reviews on that paper. The identity-trajectory framework was used to analyse the interview transcripts.

OUTCOMES
Participants' responses illustrate how various aspects of responding to reviews, and writing reviews for other authors, contribute to the development of the networking and intellectual strands of their academic identity as engineering education researchers.

CONCLUSIONS
The three strands in the identity-trajectory concept intellectual, networking and institutional interact over time. Intertextual networking is a facet of the broader networking strand and the AAEE community contributes to each others' intertextual network through the peer review process. This paper demonstrates the capacity of peer review to contribute to or impede the development of an author's intellectual strand and networking strand, we urge reviewers to be mindful of this potential when writing reviews. The continued importance and relevance of the AAEE conference for the intellectual and networking strands of its community members is applicable for all researchers, irrespective of their level of development.

KEYWORDS
Peer review, identity-trajectory, engineering education researchers

Introduction

Peer review has been the focus of an ongoing study at the last three conferences of the Australasian Association for Engineering Education (AAEE) (Willey et al 2011, Jolly et al 2011, Gardner et al 2012, Jolly et al 2012). A further development of this study has been to explore the perspective/s of the authors of these conference papers and the potential of peer review to support their development as researchers.

This is particularly relevant to our community as engineering education research is still emerging as a recognised research area in Australian universities (King, 2008, Kavanagh et al 2012). Beddoes (2011) suggests that one of the results of the emergent nature of engineering education research is that many *"leaders, such as journal editors, are longtime administrators and reformers, but not educational or social science researchers"* (p.8).

Another complicating issue is that most scholars who identify with this emerging field are engineering academics (Borrego & Bernhard, 2011). This is a complicating issue because these academics may hold research qualifications and expertise in their own stereotypical engineering field but are faced with developing new perspectives and expertise when moving into educationally related research (Beddoes 2012) and working in an interdisciplinary way in this interdisciplinary field.

Part of the difficulty engineering academics have with becoming interdisciplinary researchers could be that social research is so different to stereotypical engineering research. Jones (2011) notes that in consensus-based disciplinary classification schemes based around the work of Biglan (1973) "*high paradigmatic fields have high levels of agreement among their practitioners with regard to issues such as appropriate research topic and methods*", such as engineering, while "*low paradigmatic fields have less agreement in relation to appropriate research questions and even less agreement on appropriate methodology for addressing these questions*" (p.11), such as education. Jones (2011) also describes other disciplinary classification schemes based around the Holland theory of occupational classification. These schemes classify individuals into six personality types which were then aligned with various academic disciplines. Again engineering and education are classified in different categories implying that some changes in outlook and practice are required for engineers to undertake educational research.

As a result of engineering education research being both emerging and interdisciplinary there is a wide variety of views as to what quality research looks like (Borrego & Bernhard 2011). The implication for authors is that:

> *...reviewers, and audiences, have significantly different knowledge backgrounds. Thus, authors are caught between fields and held accountable to reviewers from different fields and should expect divergent opinions over what is appropriate and accessible.* (Beddoes 2011 p. 25)

Our previous research on reviews at AAEE conferences (Willey et al 2011, Jolly et al 2011, Gardner et al 2012, Jolly et al 2012) has shown that many reviews also generally lack the basic qualities of 'good' feedback, that of being specific and relevant (Gibbs & Simpson, 2004) and thus fail to assist researcher development.

This research looks at how the peer review of conference papers can effectively enable peer learning, and support researcher development within the AAEE community. Although peer review is required to meet government and institutional requirements for papers to be acknowledged as a research publication, we argue that our engineering education community needs to do more with the peer review process than focusing on gatekeeping and compliance. Feedback in peer review should be aimed at assisting authors to develop the standards and norms of the interdisciplinary field and develop researchers' judgement by for example, challenging them to reflect on their perspective, data collection, and interpretation

of findings. Similar arguments have been developed in relation to peer review in the domain of science education research (Eisenhart, 2002; Roth, 2002, Tobin 2002).

For engineering academics, along with our "*engineering disciplinary norms and expectations of what quality research is"* when we participate in engineering education research we also bring with us our engineering identities (Beddoes 2012 p.3). Becoming an engineering education researcher:

> *...demands more than just learning the rules of what to do when. It requires the construction of an identity that can include these different meanings and forms of participation... The work of reconciliation* [of differing identities] *may be the most significant challenge faced by learners who move from one community of practice to another…and is an on-going process... (Wenger 1998, p.160).*

Developing knowledge and skills in engineering education research is a multi-faceted, complex and sometimes lengthy process that can be interpreted as the development of an academic's identity. To be a researcher in the field of engineering education means to act, talk and think like an engineering education researcher i.e. to identify as an engineering education researcher. Engineering faculties that seek to broaden their research base into engineering education need to be mindful of the impact of identity development on their academics' successful transition into this different research paradigm:

> *Academic literacy is about more than reading and writing; it comprises both thinking critically and taking action and thus is related to identity development. (McAlpine 2012 p. 259)*

Theoretical Background

Brew (2001, 2006) reports on the different ways that academics conceptualise their research and tells us that the way academics think about their research is strongly linked to their identity. Gee (2000) contends that identity is continuously in construction and is developed in relation to others. In the academic context this can be interpreted as what type of academic activity we engage in and which academic community we look to for recognition as underpinning our developing identity as an academic (McAlpine et al.,2008). Tonso (2006) describes this by characterising identity development as '*thinking about oneself, performing, and being thought of as*' a particular type of person or member of a particular community.

McAlpine and various colleagues (McAlpine et al 2010, McAlpine and Lucas, 2011, McAlpine & Amundsen, 2011, McAlpine and Turner 2012) have proposed an identity-trajectory framework to describe the development of academic identity. This framework consists of three intertwined strands: intellectual, networking, and institutional, which interact asynchronously over time as modelled in Figure 1.

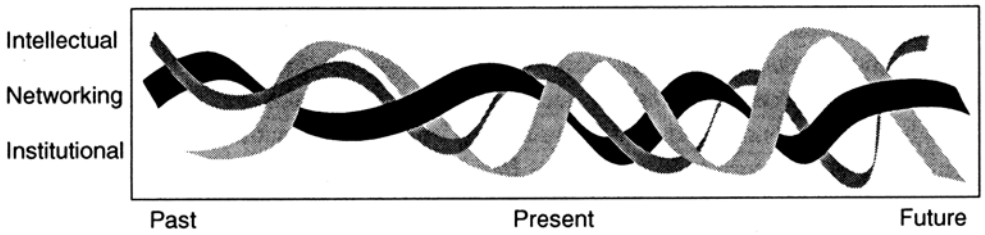

Figure 1: The interweaving of strands of identity (McAlpine & Amundsen 2011, p.178)

The intellectual strand represents*"contributions to one's disciplinary specialism or field. The intellectual strand leaves a trail of artefacts, e.g. publications, citations, papers, course/curriculum design*" (McAlpine & Amundsen 2011p.179) and, we suggest, reviews. The networking strand represents the range of

> *...local, national, and international networks one has been and is connected to, and...includes (a) research and publication collaborations with others; (b) cross-institutional*

> *course/curriculum design; (c) work with professionals...and (d) membership of disciplinary organizations* [such as AAEE] *and on journal boards*." (McAlpine & Amundsen 2011, p.179).

The intellectual and networking strands strongly interact with each other with the networking strand "*establishing the intellectual location for one's contributions*" (McAlpine & Amundsen, 2011, p.180) and so are largely focussed beyond the individual institution where an academic may be employed.

The framework also includes an institutional strand which represents the interactions of the academic in their workplace. McAlpine & Amundsen (2011) found that institutions can *"support or constrain an individual's networking and intellectual strands" (p.180*). In our context institutional support of the networking and intellectual strands could be by for example providing funding to attend the annual AAEE conference.

Of particular relevance to our research on peer review of conference papers is the notion of the 'intertextual network' which facilitates learning about the discipline area:

> *Learning through reading involved understanding how scholars in the field communicate through varied genres, e.g. papers, manuscript reviews and funding proposals. Learning the discourse was essential (e.g. how claims are made or the positioning of the researcher/author), but also how textual practices are tied to actual research practices (e.g. what is an appropriate question in a field, what is considered appropriate or essential evidence)... Learning to read–understand in the chosen field is necessary to interacting within the field... (McAlpine 2012, p 356)*

Beddoes (2012) illustrates that reviewers play a part in an author's intertextual network:

> *... numerous individuals are involved in bringing an article to its published version... articles are often the result of multiple and competing deliberations and negotiations. They contain knowledge and opinions not only of the authors, but also of reviewers and editors. (*p.8).

This paper reports on insights obtained from using the intertextual networking concept of the identity-trajectory framework to examine the relationships between peer review and academic identity construction for engineering education authors in the AAEE community.

Approach

Our research approach is interpretive using the identity-trajectory concept as a framework or a 'lens' through which to view the data. This research methodology is heavily influenced by the methods used by McAlpine and colleagues in creating the identity-trajectory concept (McAlpine et al 2010, McAlpine and Lucas, 2011, McAlpine & Amundsen, 2011, McAlpine and Turner 2012).

Sampling

The identity-trajectory concept was used to determine characteristics of engineering academics that we should focus on in our research so that we build variation into the data (Corbin & Strauss, 2008). The aim of deliberately having variation in our samples is to allow for the appearance of differences in the dimensions defined by the framework so that we "*capture*" (Corbin & Strauss, 2008, p.306) as much of the complexity of our context as we can. A framework helps us 'capture' this variation in a systematic way.

This study focuses on engineering academics with engineering qualifications, who are also 'active' members of AAEE. In this project we are defining engineering academics as 'active' members of AAEE if they authored a paper for the 2012 AAEE conference AND at least one of the three previous years' AAEE conferences. The author list from these conferences (available in the proceedings) was used to identify potential participants and these thirty-eight academics were invited to participate in the research project. Nineteen of these authors accepted the invitation.

Participants were classified according to what type of university they work for (Group of Eight (Go8), Australian Technology Network (ATN), regional, or metropolitan unaligned as described in Table 1 – for variation in the institutional strand); and their level of expertise in

engineering education research (emerging, intermediate, established – for variation in the intellectual strand).

A participant's level of experience as an engineering education researcher was determined by the number of specific types of publications they had written in the last four years (conference papers, journal papers, book chapters) along with other indicators of research activity such as being the project leader of a grant where the funding is provided through a nationally competitive process, whether they are supervising research students working on educationally related topics, and whether they were currently serving in an editorial role for an educationally related journal. Using this system, participants fell into three broad groups: emerging, intermediate, and established researchers.

Table 1: Type of university

Type of university	Description
Group of Eight [Go8]	The 'Group of Eight' (http://www.go8.edu.au/home) is a coalition of eight research-intensive universities located in state capital cities, which tend to be the oldest universities in Australia. .
Australian Technology Network [ATN]	The ATN is an alliance of five universities, each located in the capital city of a mainland state of Australia. These universities badge themselves as practice-based and their research is focussed on the needs of industry and the community.
Regional	Regional universities are those with their main campus in a regional city or town rather than a state capital city. As well as on-campus students, these universities are characterised by significant numbers of external/distance students.
Metropolitan unaligned	The metropolitan unaligned universities are those based in a state capital city, but not included in the Go8 or the ATN.

Interview protocol

Semi-structured interviews were conducted with each participant in their campus office, or an alternative location nominated by them. Each interview took approximately an hour and occurred in the timeframe between three weeks and five months after the deadline for submission of the final version of the paper to the conference. During the interview participants were asked to re-read the reviews they received on their paper, comment on how reviews in preparing the final version of their paper, and explain any changes they had made between the draft and final versions either independently or as a response to these reviews. This generated discussion about the reviews themselves and about the changes the participants had made to their papers that were prompted by review comments.

Data analysis

A document analysis was conducted comparing each participant's draft paper submitted for review for the 2012 AAEE conference, to the final version of their paper. The two reviews of each paper were also examined.

Transcripts were created from audio recordings of the interviews, which were then coded in NVivo 10 for a priori themes relating to identity-trajectory strands (intellectual, networking and institutional). Studying the interview transcripts we were able to find many instances relating to the intellectual strand, the networking strand and the institutional strand of participants' identity. In this paper we discuss the impact the intertextual networking processes involved in writing a conference paper, especially the peer review process, had on the intellectual strand of the participant, as we consider this to be most relevant and important to this conference community.

Intertextual networking outcomes

The networking strand encompasses the academic community beyond the participant's university and includes the AAEE community and reviewers as well as the authors of the literature they read and cite. Peer review is an element of 'intertextual networking' (Beddoes 2012) and is shown to have contributed to the intellectual development of some authors, not always by a reviewer explaining something to an author but also by questioning their method/s so that authors are motivated to better articulate their stance, as illustrated by one of our participants:

> *...your feedback from a reviewer might tell you... why haven't you looked at this and where's the evidence, or what's the actual outcome here?" [established, ATN]*

The following quotes from participants highlight how interaction with the peer review has resulted in a change in their thinking or practice i.e. has resulted in some change to their intellectual strand:

> *The reviewers picked up on things; weaknesses that I already knew were in the paper...There was one comment in particular... I thought that bloody useful, and actually **it changed the way I thought about it**... it gave me the, 'Oh now I know what I'm going to do with this paper'. So it certainly did give me the direction that I needed to complete the paper the way I wanted to. [emerging, regional]*
>
> *There was one comment here [in a review] about the use of the extracts from focus groups. They [reviewer] weren't convinced that that was a way to show results. I'd seen other papers that had done that. So ... **it made me think...** [emerging, metropolitan unaligned]*
>
> *That's where I think conference papers are really useful... You write it to participate in the discourse and also get participation from other people in what you're doing... or **to give someone new ideas, or to get new ideas from somebody**... its dialogue. [intermediate, regional]*

As well as influencing their intellectual strand these authors show how the review they received for their paper prompted them to re-engage with other elements of their intertextual network:

> *So this one* [review] *was more referenced to literature…. So I … dug into the paper, couldn't find it anywhere... So that…**led me to reading in a more deep way** some of the literature that I've already read…Like I read* [another author's] *paper again. The first time I read that I thought 'Oh, ...amazing'... Then I went back to try and find something to quote and I thought this is really a bit thin on pedagogy. **So that changed my perception**...* [intermediate, ATN]

Another way that peer reviews extend an author's intertextual networking strand is through the process of reviewing other authors' conference papers. Several participants commented that they learn from reading the papers they are asked to review, i.e. that this type of intertextual networking also contributes to the development of their intellectual strand:

> *If you're a reviewer, it's also a **learning exercise for yourself** to go oh this is a really good paper or they've taken an interesting approach or whatever...it's an educational process for the community. [established, ATN]*
>
> *It makes **you learn about things** that because you now have to read a paper you actually read a bit more... So it is good reviewing because it just makes you read papers that you sometimes just don't get time the read - well, you do have the time if you really made the time but you don't. This just forces you to sit down and read some papers, which is always good.* [emerging, metropolitan unaligned]
>
> *...it's good ... to read other people's work to get an **idea of what's out there**... Also to get an **idea of how other people write**... I'll criticise something then realise I've done it myself in my own paper. [emerging, Go8]*

And they learn more by reading the paper than by just listening to the presentation:

> *...at a conference presentation if it's the first time you hear about a paper, it just goes over your head. Even if it's a good idea. I write it down, it's still not the same as if I've read it...if I*

> *go to their presentation for a paper I've reviewed and I really enjoyed, eventually I meet that person in the lunch queue and I say I really like your paper on ... That will be a really deep connection that happens just because you've reviewed the paper*. [intermediate, ATN]

This quote also shows how the conference provides an opportunity to transform elements of our intertextual network into part of our personal network i.e. at the conference we can meet the author/s of papers in our intertextual network in person.

Especially for a first time reviewer of AAEE papers, reviewing involved a 'paradigm shift' in their thinking about research, and helped them learn about the discourse of the field:

> *...because I'm outside of my normal field... it was a paradigm shift...in terms of familiarising myself with the field of discourse - engineering education - the whole thing was educational...quite stimulating and valuable...Personally worthwhile... I wouldn't have done it otherwise. I was there to learn about the discourse... As such, getting involved as a reviewer is quite a healthy way to engage yourself in a discourse.* [emerging, Go8]

An established researcher commented that writing papers and engaging with the review process are connected, which comes back to how the intertextual network is intertwined with the intellectual development strand:

> *...they're all connected, and interconnected, and the fact that we can learn from others - you know I've heard people saying they're not doing reviews or they don't ever do them, and I'm saying well I think you're missing an opportunity to understand how other people have tackled the same issue, and I think we need to open our eyes and be a little bit more adventurous and brave and not be afraid to learn off our peers and give feedback to our peers. [established, ATN]*

Authors also learned about reviewing by seeing other reviewers' comments (after their review was submitted) as it allowed them to benchmark their thinking:

> *As a reviewer, after the process is finished, I always do whatever I can to hunt down the comments from the other reviewers on the paper that I reviewed... Anonymously, of course but I still got to see what the other people thought, which was again, very interesting and illuminating for me*. [emerging, Go8]

> *There doesn't appear to be a lot of feedback to do a review in this particular process, so without someone coming back and saying well, perhaps you were a bit harsh, or giving you a review on my review then it's whether or not they accept it, that is a very crude way of getting feedback I guess*. [emerging Go8]

Both of these participants are emerging researchers, so this seeking of feedback on their reviews may be a reflection of their inexperience in our field. They are seeking assurance of their understanding or at least to compare their understanding to others, so they can evaluate differences, as part of the process of learning about the field. Conference organisers need to keep in mind this variation in expertise in our community when asking people to review papers and be prepared to sometimes make their own judgements if there is disagreement about the decision to accept or reject a conference submission.

Perceptions of the quality of the review are also dependent on the expertise of the author. To illustrate this we can see that an emerging researcher was "...*fairly happy with the reviews I had this year...the reviewers and the reviews that I got have improved*..." which we can contrast with a statement from an established researcher at the same university that generally review quality is poor: "...*yeah, I think refereeing is ...not all that good these days*". To improve the usefulness of peer reviews we urge reviewers to be specific and relevant when writing their reviews and to clearly articulate what they mean. For example part of a review of an earlier version of this paper points to the lack of "*qualitative and quantitative analysis*" and that results are *"...not shown methodologically*." The review would have helped us more if it had indicated how the reviewer thought quantitative methods would contribute to our research outcomes and what they mean by "*methodologically*". The review concludes by saying that "...*more work is needed*". While we agree with this statement, again a more specific indication of what particular work the reviewer feels should be undertaken would

have contributed more to our development as researchers. As it is we were left guessing what the reviewer might have meant.

Considering the work we have undertaken so far we suggest further research in this area could investigate the effects of differences such as individual ethnicity, cultural background or gender in academic identity development. While some interview transcripts allude to one or another of these aspects, they are not the major focus of this study but would be interesting extensions

In summary our participants have shown that peer review can change their thinking or practice and can prompt them to re-engage with published literature. Furthermore, being part of the peer review process gave them an opportunity to learn from the papers they were asked to review. In these ways the review process contributed to the development of the networking and intellectual strands of their academic identity as engineering education researchers. The intentional use of peer review to contribute to each others' development as researchers has implications for lifting the profile of the engineering education community and the AAEE community in particular:

> *...in terms of the profile of engineering education research, I think it's really vital that we do this...as a community*" [intermediate, ATN]

Conclusions

The three strands in the identity-trajectory concept are intellectual, networking and institutional which interact over time. Intertextual networking is a facet of the broader networking strand and the AAEE community contributes to each others' intertextual network through the peer review process. This paper demonstrates the capacity of peer review to contribute to or impede the development of an author's intellectual strand and their networking strand, we urge reviewers to be mindful of this potential when writing reviews. The continued importance and relevance of the AAEE conference for the intellectual and networking strands of its community members is apparent for researchers, irrespective of their level of experience.

References

Beddoes, K. (2011) *Practices of Brokering: Between STS and Feminist Engineering Education Research*. Unpublished PhD dissertation, Virginia Tech, Department of Science and Technology Studies, Blacksburg, Virginia, December.

Beddoes, K. (2012) Using peer reviews to examine micropolitics and disciplinary development of engineering education: a case study, *Discourse: Studies in the Cultural Politics of Education*, DOI:10.1080/01596306.2012.745735

Biglan, A. (1973) The characteristics of subject matter in different academic areas. *Journal of Applied Psychology*, 57 (3), 195 – 203.

Borrego, M. & Bernhard, J. (2011) The emergence of engineering education research as an internationally connected field of inquiry, *Journal of Engineering Education*, 100(1), pp. 14-47.

Brew A. (2001) Conceptions of Research: A phenomenographic study, *Studies in Higher Education*, 26:3, 271-285

Brew A. (2006) *Research and Teaching: Beyond the Divide*. London: Palgrave Macmillan.

Corbin J. & Strauss A. (2008). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 3rd edition. Sage Publications.

Eisenhart, M. (2002). The paradox of peer review: Admitting too much or allowing too little? *Research in Science Education*, 32(2), pp.241-255.

Gardner, A., Willey, K, Jolly, L. & Tibbits, G. (2012) Peering at the peer review process for conference submissions, *Proceedings of the Frontiers in Education Conference*, 3-6th October, Seattle, USA.

Gee J. P. (2000) Identity as an Analytic Lens for Research in Education Review of Research in Education Vol. 25, pp. 99 – 125.

Gibbs G & Simpson C. (2004) Conditions under Which Assessment Supports Students' Learning. *Learning and Teaching in Higher Education*, 1, pp.3-31.

Jolly, L., Tibbits, G., Willey, K. & Gardner, A., (2011) Conferences, reviews and conversations about improving engineering education, *Proceedings of the Research in Engineering Education Symposium*, October, Madrid, Spain.

Jolly, L., Willey K., & Gardner, A. (2012) Quality in Engineering Education Research: arriving at consensus, *Proceedings of the Annual Conference of the Australasian Association for Engineering Education*, 3-5 December, Melbourne, Australia.
Jones W. (2011) Variation among academic disciplines: An update on analytical framework and research Journal of the Professoriate 6 (1) pp. 9 – 27.
Kavanagh, L., O'Moore, L., & Jolly, L. (2012) Mad as hell and not taking it any more?: job satisfaction amongst engineering educators in Australian universities, *Proceedings of the Annual Conference of the Australasian Association for Engineering Education*, 3-5 December, Melbourne, Australia.
King, R. (2008) Addressing the supply and quality of engineering graduates for the new century. A report prepared for the Carrick Institute for Teaching and Learning in Higher Education, Australia.
McAlpine, L., Jazvac-Martek, M., & Gonsalves, A. (2008).The question of identity: Negotiating roles and voices in evolving academic systems. In R. Barnett & R. Di Napoli (Eds.). *Changing Identities and Voices in Higher Education* (pp.113-123). London, UK: Routledge.
McAlpine, L., C. Amundsen, and M. Jazvac-Martek (2010). Living and imagining academic careers. In *Becoming an academic: International Perspectives*, ed. L. McAlpine and G. Akerlind, 125–54. London: Palgrave Macmillan.
McAlpine L. and Lucas L. (2011): Different places, different specialisms: similar questions of doctoral identities under construction, *Teaching in Higher Education*, 16:6, 695-706.
McAlpine, L. & Amundsen, C. (2011) Making Meaning of diverse Experiences: Constructing an identity through time", in *Doctoral Education: Research-based strategies for doctoral students, supervisors and administrators*, ed L. McAlpine & C. Amundsen, pp.173-183, Springer, London.
McAlpine L. and Turner, G. (2012): Imagined and emerging career patterns: perceptions of doctoral students and research staff, *Journal of Further and Higher Education*, 36:4, 535-548.
McAlpine, L. (2012): Shining a light on doctoral reading: implications for doctoral identities and pedagogies, *Innovations in Education and Teaching International*, 49:4, pp.351-361
Roth, W. M. (2002) Editorial power/authorial suffering, *Research in Science Education*, 32(2), pp. 215-240.
Tobin, K. (2002). The multiple faces of peer review in science education. *Research in Science Education*, 32(2), 135_156.
Tonso, K. (2006). Student engineers and engineer identity: campus engineer identities as figured world. *Cultural Studies of Science Education,* 1, 272-307.
Wenger, E. (1998). *Communities of Practice*. New York: Cambridge University Press.
Willey, K. Jolly, L. Tibbits G. & Gardner, A. (2011) Investigating research quality and the review process: some suggestions for improvement, *Proceedings of the 39th Annual SEFI conference*, J Bernardino and J. C. Quadrado (eds), September 27-30, Lisbon, Portugal.

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