Grading mathematics education research journals

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Presentation of the project and initial motives[1]

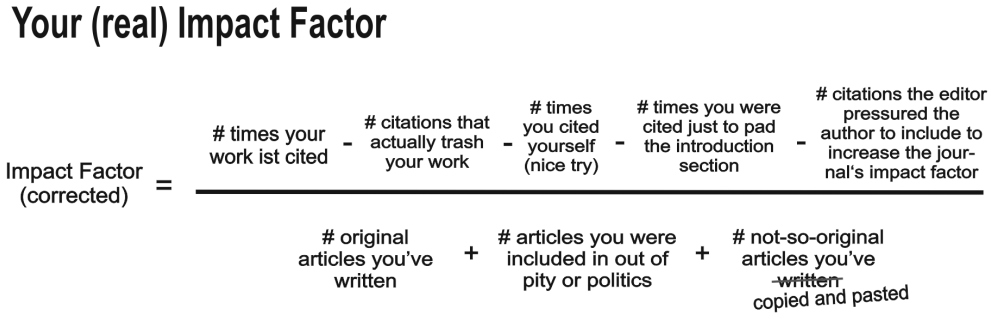
Nowadays, all researchers are aware of the increasing importance accorded to the ranking and grading of scientific journals; it is now difficult to escape their influence. The systems that currently exist are often based on crude statistical analyses that have little to do with scientific quality (see e.g. Arnold & Fowler 2011). For these reasons, the Education Committee of the European Mathematical Society (EMS), together with the Executive Committee of the European Society for Research in Mathematics Education (ERME), and supported by the International Commission for Mathematical Instruction (ICMI), decided in 2011 to organize a consultation in order to propose a grading of research journals in mathematics education based on expert judgment. A similar project has already been carried out for Chemical education and Science education journals (Towns & Kraft, 2011).

The approach adopted was to initiate a process which will need further elaboration and regular updating. For this reason, amongst many possible choices of method, we always opted for what appeared to be the most straightforward. We present below our methods and the results obtained.

Organization of grading by experts

A working group, bringing together members of the ERME board, and members of EMS educational committee, was formed to take charge of the whole process. We (the members of this group) first prepared a long list comprising 49 journals. We graded the journals, and compared our grades with the European Reference Index for the Humanities 2011 lists (https://www2.esf.org/asp/ERIH/Foreword/search.asp; all the mathematics education research journals mentioned as interna-

[1] Zuerst veröffentlicht in: Newsletter oft the European Mathematical Society, Issue 86 (2012), pp. 52–54, http://www.ems-ph.org/journals/newsletter/pdf/2012-12-86.pdf . Wiederabdruck mit Genehmigung der Autoren.



Jorge Cham: Piled Higher and Deeper (www.phdcomics.com)

tional on the ERIH list have been kept). This led us to retain a short list of 28 journals.

At the same time we constituted a panel of 91 experts in the field, representing the 42 countries members of EMS and/or of ERME. Each country was represented by a number of experts ranging from 1 to 7, according to the size of the mathematics education research community in this country.

These experts were contacted, and asked to grade the journals, using the scale presented below. They were also invited to formulate any comments they wished to make on the process, and to suggest other journal titles, if they considered that important journals were missing from the list.

Criteria

The experts were invited to grade the journals on a four-point scale: A*, A, B or C, or to declare that they did not know the journal and code it with an X. The scale was defined according to four dimensions, characterizing each rank: recognition; review process and quality standards; editors and editorial board; citations. For example, the ranks A and B are described as:

A

- *Recognition:* The journal is recognised amongst researchers around the world as a strong one in the field of mathematics education.
- *Review process and quality standards:* Through a systematic process of peer review the journal maintains high standards with a view to publishing research that displays the intellectual rigour, originality and significance that will be recognised as making a valuable contribution to the field.
- *Editor(s) and editorial board:* The editor(s) and the members of the editorial board of the journal are themselves highly regarded researchers, many already recognised as international leaders in the field of mathematics education.
- *Citations:* The journal is regularly cited in other journals, and many high quality research publications in mathematics education make some reference to work published in it.

B

- *Recognition:* The journal is recognised by researchers around the world as an estimable one in the field of mathematics education.
- *Review process and quality standards:* Through a process of peer review the journal sets standards of rigour, originality and significance that command international respect within the field.
- *Editor(s) and editorial board:* The editor(s) and the members of the editorial board of the journal are themselves well regarded researchers in the field of mathematics education.

Answers and statistical choices

We received answers from 75 experts, representing 32 countries. In some answers, certain responses were missing; we replaced these by "X". A few experts proposed letters such as "D"; we replaced these with "C".

We decided to:

– Confirm a grade A* for all the journals rated A* by 50 experts or more (at least two thirds of the experts)
– Confirm a grade A (, B, C) to all the journals rated A (, B, C) or better by 50 experts or more (at least two thirds of the experts)
– Withdraw from the list all the journals that have more than 25 codes X (more than a third of the experts declare that they do not know the journal).

Some experts proposed additional titles. Nevertheless, no title was proposed by more than 8 experts; we decided thus not to add titles to the list.

Results

Following these principles, 2 journals received a grade A*; 5 journals, a grade A; 5 journals, a grade B; 5 journals, a grade C. 11 journals were removed from the initial list of 28, because more than 25 experts declared that they did not know these journals.

The following table presents the final results of the grading process.

Grade	Title
A*	Educational Studies in Mathematics Journal for Research in Mathematics Education
A	For the Learning of Mathematics Journal of Mathematical Behavior (The) Journal of Mathematics Teacher Education Mathematical Thinking and Learning ZDM: The International Journal on Mathematics Education
B	International Journal of Mathematical Education in Science and Technology International Journal of Science and Mathematics Education Mathematics Education Research Journal Recherches en Didactique des Mathématiques Research in Mathematics Education
C	Canadian Journal of Science, Mathematics and Technology Education Journal für Mathematik-Didaktik Nordisk matematikkdidaktikk / Nordic Studies in Mathematics Education, NOMAD Technology, Knowledge and Learning (formerly: International Journal of Computers for Mathematical Learning) The Montana Math Enthusiast

Grading Mathematics Education Research Journals – eine Initiative des Committee of Education der European Mathematical Society (EMS) und der European Society for Research in Mathematics Education (ERME)

Publikation ist nicht gleich Publikation, doch damit fängt das Problem bekanntlich an: *Wie vergleichen wir das wissenschaftliche Gewicht von Publikationen?* Für Mathematiker/innen ist es eine Selbstverständlichkeit, dass Ordnungen sich nicht nur linear realisieren lassen, das mag gut klingen, doch lassen sich daraus Konsequenzen ziehen? Wir fürchten nein, ‚Skalen' sind gefragt.

Hinlänglich bekannt ist, dass nicht wenige Wissenschaftsbereiche bei der Bewertung den Impact Faktor[a] einer Zeitschrift heranziehen. Näheres über die Berechnungsmodalitäten findet man bei wikipedia. Es ist bekannt, dass die Objektivität dieses Maßes vielfach in Zweifel gezogen wurde, ja, dass diese Parameter manipuliert werden können. Was nicht gut ist, muss man besser machen, so könnte man meinen, und daher beschäftigt sich seit 2010 eine Arbeitsgruppe[b] der International Mathematical Union (IMU) und der ICIAM mit der Frage eines (für mathematische (!)) Zeitschriften besseren Rankings als der Impact-Faktor (vgl. den ersten Report (2011)[c]. Mittlerweile stellt sich heraus, dass die Aufgabe erheblich komplexer als angenommen ist, und dass jede Bewertung durchaus auch wissenschaftspolitische Konsequenzen haben könnte; insofern steht man auch vor einer Entscheidung, ob in der Community genug Konsens für diese Maßnahme vorhanden ist. Mit anderen Worten: Von Seiten unserer Nachbarwissenschaft können wir bis auf weiteres keine ‚Hilfe' erwarten.

An das Committee of Education[d] der European Mathematical Society (EMS) sind vor rund anderthalb Jahre Bitten von Mathematikdidaktiker/innen aus Belgien und Italien herangetragen worden, sie in ihrer Arbeit beim Herausstellen von wissenschaftlichen Publikationen zu helfen. Sehr oft sind unsere Kolleg/innen in erziehungswissenschaftlichen Fakultäten angesiedelt; ihre Forschungspublikationen werden vor dem Hintergrund des Social Sciences Citation Index (SSCI) bewertet, der ganze drei mathematikdidaktische Zeitschriften enthält. Auch die ERIH Initial List: Pedagogical and Educational Research (2007) der European Science Foundation definiert ein Ranking; letzter enthält 7 mathematikdidaktische Zeitschriften in einer B-Kategorie und 2 in einer C-Kategorie, mit anderen Worten: Keiner Zeitschrift wird Status A zugesprochen.

Die Erfahrungen im Bereich der Mathematik zeigen, dass wir uns verheben würden, wären wir bemüht, das Problem gründlich und umfassend anzugehen. Letztlich bleibt jede Bewertung subjektiv und geht nicht selten von – oft nicht offengelegten – Voraussetzungen aus. Insofern hatte unser EMS-Committee of Education in Absprache mit der ERME beschlossen, wie weiter unten näher beschrieben, sich des Problems anzunehmen.

Soviel sollte man uns zugute halten: Es ist ein erster Versuch, sich mit dieser Frage auseinanderzusetzen und – wie die Diskussion auf der CERME im Februar 2013 deutlich gemacht hat – ein Update in 1–2 Jahren mit einer größeren ‚Expert/innenzahl' und unter Berücksichtigung von mehr Zeitschriften, z. B. auch aus dem statistischen Bereich scheint angeraten. Der erforderliche Arbeitsaufwand ist allerdings nicht trivial. Ferner liegt es an dem/der einzelnen Wissenschaftler/in, inwieweit er/sie diese Ranking-Liste einsetzen will. Möglicherweise lässt sich ein/e (nicht mathematikdidaktisch affine/r) Dekan/in überzeugen, dass die Publikationsergebnisse einer Person in unserer Community aufgrund des Publikationsortes hohe Wertschätzung genießen; es mag aber auch Fälle geben, in welchem auch unser Ranking nicht weiter hilft.

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a. http://de.wikipedia.org/wiki/Impact_Factor#Kritik b. http://www.mathunion.org/fileadmin/CEIC/bestpractice/bpfinal.pdf c. http://www.mathunion.org/fileadmin/IMU/Report/WG_JRP_Report_01.pdf d. http://www.euro-math-soc.eu/comm-education2.html

Limitations of the grading process and need for further studies

Naturally, this process has a number of limitations. We note, here, some that we discussed during our work, and which were also expressed by some experts in their comments.

- A grading produced by European experts risks being Europe-centered.
- Only journals overtly focused on mathematics education have been included. Journals about education at large are also very important for the researcher in the field, and are not mentioned in the list.
- The list contains mainly journals written in English.
- Journals about more specific topics, such as statistics education in particular, are unknown to many experts, but may be of high scientific quality.

All these remarks correspond to real limitations of our study. They evidence the need for further studies: ICMI could decide a similar grading at a world-wide level; equally, more local initiatives could better recognize journals in languages other than English, or with specific foci. The scientific quality of journals is always evolving anyway; a change in the reviewing process, for example, can

lead to an improvement of a journal. Thus any grading should keep the possibility of updating and evolution; the grading proposed here is presented as our best attempt at assessing the current situation.

References

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Towns, M.H., & Kraft, A. (2011). The 2010 Rankings of Chemical Education and Science Education Journals by Faculty Engaged in Chemical Education Research. *Journal of Chemical Education*, 2012, 89 (1), 16–20

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