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Hydrology and Earth System Sciences Discussions

Interactive comment on "Moving university hydrology education forward with geoinformatics, data and modeling approaches" *by* V. Merwade and B. L. Ruddell

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This is an interesting and valuable article that presents an overview of the current status of using digital support tools (models, data, visualisation, etc.) in hydrology university education in USA. Results from surveys and workshops carried out with hydrology university educators are presented that indicate the requirements and critical steps in moving forward towards a community-based development and sharing of new hydrology education curricula with associated digital supporting tools. The use of such supporting tools is identified to be more widespread at graduate levels, but there is a

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lack of such support at undergraduate levels. The opinion expressed in the article is that community-based approach for developing, sharing and using adequate curricula and supporting would be benefitial, although a number of challenges still remain. The article is clearly written and should be published after addressing few, mainly general cooments, provided as follows:

1. The material in the article is focused on the current situation regarding hydrology edication and usage of supporting tools in the USA. This is understandable since the authors seem to be most familiar with this situation. Although at the end of the introduction the authors state that the content presented in the article 'bears relevance to the global hydrology community's challenges and interests', there is no discussion on this later in the article. While many development in USA (especially, for example those of CUAHSI) may be very benefitial to university hydrology educators in other parts of the world, there are also significant barriers to reusing educational components elsewhere. Putting aside the obvious language barrier, there are issues regarding the context of presenting hydrological knowledge (social, economic, even pollitical and judiciary), which may be very different from one country to another, and especially when considering developing countries. The scientific aspects of hydrology are, of course, universal, but the differences in context may lead to diffences in knowledge needs and consequently impair the desired community-based sharing of educational content. Even a simple issue of using US measuring units (rather than SI units) may deter a potential user from using some educational material developed in USA. Therefore the authors are invited to provide some discussion regarding the opportunities and challenges in developing a truly global community-based environment for developing and sharing of curricula and digital support tools for hydrology education from their USA perspective.

2. The above comment becomes even more relevant, when one notices that the authors recognise 'cutural differences between the engineering and geoscience application domains of hydrology and their affiliated disciplines....' (page 2610, lines 18-22)

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as one of the potential barriers to a shared hydrology community resource, even within same country. In my opinion these diffences will remain, together with the 'bifurcations' (as the authors call them) between 'water quantity' and 'water quality' or similar branching of topics. Hydrology is and will remain a multi-disciplinary science, with many sub-specializations (hydrology as earth science, engineering hydrology, agricultural hydrology, eco-hydrology, etc.). Therefore the goal of integrating existing (and future) content within one 'broader community curriculum' (page 2611, lines 1-9) may be quite challenging. It is difficult to see what will be the value of such integration, beyond having a repository of hydrology education curricula and supporting tools that can be discovered and re-used. While the creation of such a repository may be benefitial, the authors are not entirely clear about the kind of 'integration' they expect and recommend to occur via the community resource that they are proposing.

3. Regarding the supporting tools (DMDGC toolsets) the situation desribed in the second paragraph of page 2611 (with three classes of toolsets) is in fact not surprising. The Type 1 common tools such as Excel / ArcGIS are generic in nature and they would be used in many hydrology courses (also at undergraduate level). Type 2 (toolbar extensions added to computing environment) and 3 (numercal models) are usually more specialised and are expected to be used correspondingly at graduate level and by researchers. The key question here is whether sophisticated tools (such as numerical models, for example) can become more widespread in hydrology education. Although this may be difficult for basic hydrology courses (because of lack of students' background), such tools, when develped with suitable visualisation interfaces, can have the power of explaining physical phenomena involved in hydrologicakl processes, potentially stronger than traditional approaches with mathematical formulations and associated textual explanations. Researchers and educators from the field of hydroinformatics have been exploring this potential for more than two decades for both classroom (face to face) and online learning (see Abbott et al. (1994), Molkentin et al. (2001) Price et al. (2006), Price et al. (2007), Jonoski and Popescu, (2012)). The authors are invited to comment on their experiences and perception of this potential in the USA.

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4. The article seems to focus on community-based development and sharing of curricula and supporting tools for usage in classroom-based education. Given the growth in online education (also in hydrology), which has significantly different educational approaches (and potentially relying even more on digital support tools) the authors are invited to comment on the potential of the community-based hydrology education resources in these situations.

5. One issue that needs to be emphasised is the need for partnership between universities and educational institutions with agencies and commercial companies who produce hydrology-related software tools. The authors have found from their surveys and during the workshop that educators have strong preference for freely available tools. Other experiences, however, show that inclusion of software tools that will be later used in practice may be more appreciated by the students as well as more instructive for usage during the education modules (classroom or online). This software may be licenced, but through partnerships with the software producers it is frequently available for free or at nominal fee for educational purposes. The experiences in hydroinformatics education show that a mixture of free and licenced software may be most preferred option in education.

6. Finally, the realization of the community-based resource as envisaged in the article critically depends on development and provision of right incentives for the members of the community. This issue is mentioned in the conclusions of the article twice (in first bullet at the end of page 2620 and again in lines 7-9, page 2623). On the other hand, this has not been mentioned earlier in the article. The authors are invited to provide explanations about this. (Was this not something that was included in the survey or in theworkshop and why?.)

Small editorial comments:

1. Line 12 - page 2604 : the word 'is' should be removed.

2. Lines 9-10 - page 2617: I don't understand the phrase ' water movement across

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multiple environmental gradients' - perhaps it can be modified.

3. I suggest some modification of the title that will reflect the 'community-based resource' proposed in the article. Perhaps 'Moving university hydrology education forward using community-based geoinformatics, data and modelling resources' (Just a suggestion).

Additional references:

Abbott M. B., Solomatine D., Minns A. W., Verwey A. and W. Van Nievelt (1994) Education and training in hydroinformatics, Journal of Hydraulic Research, Vol. 32, Iss. sup1, Taylor & Francis.

Price R.K., Popescu I., Jonoski A. and Solomatine D. (2006) "Fifteen years of experience in hydroinformatics at UNESCO-IHE Institute for water education" , 7th International Conference on Hydroinformatics HIC 2006, Nice, France.

Price, R.K., Bhattacharya, B., Popescu, I., and Jonoski, A. (2007) "Flood modelling for management: UNESCO-IHE's online course in hydrology", Bulletin of World Meteorological Organisation, 56(2), 102-106

Jonoski A. and Popescu I. (2012) Distance Learning in Support of Water Resources Management: An Online Course on Decision Support Systems in River Basin Management, Water Resources Management 26:1287–1305 , Springer.

Molkenthin F., Holz P. K., Belleudy p., Jozsa j., Price R.K. and van der Veer P. (2001) HydroWeb: "WWW based collaborative engineering in hydroscience"–a European education experiment in the Internet, Journal of Hydroinformatics 3 (2001) 239-243, IWA Publishing

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