Peer Review Report

Review Report on Subsurface Geosciences Learning in Virtual Reality: A case study in Central Luconia Province, Malaysia

Original Research, Earth Sci. Syst. Soc.

EVALUATION

Q 1   Please summarize the main findings of the study.

The work explores the use of 3D visualisation to support understanding and skill development for the student learning experience with an emphasis in subsurface characterisation in petroleum geoscience. The manuscript also examines student feedback through a series of structured survey questions.
The key findings appear to be that 3D visualisation can offer a multiscale and multivariate approach – which is so important for subsurface characterisation – to support education and skill development and that students found the opportunity beneficial.

Q 2   Please highlight the limitations and strengths.

The strengths of the work are that while 3D visualisation is becoming more commonly used in education and skill development to supplement field teaching, the number of publication on this topic is very limited. The addition of a the review of student experience is also of value.

The limitations are that the study uses commercial software under an educational licence – this limits the opportunity for others to replicate or use the study in future educational needs.

To increase the usefulness and impact of the study, the transferability of the work and findings could be highlighted and strengthened, including the opportunity to use equivalent openly accessible software, the transferability to other areas of geoscience (petroleum geoscience is becoming less acceptable and limited) and the opportunity to combine with fieldwork or lab (core analysis etc) work.

Q 3   Please comment on the methods, results and data interpretation. If there are any objective errors, or if the conclusions are not supported, you should detail your concerns.

The methods, results and data interpretation are all appropriate.

Q 4   Check List

Is the English language of sufficient quality?
   Yes.

Is the quality of the figures and tables satisfactory?
   No.

Does the reference list cover the relevant literature adequately and in an unbiased manner?
   Yes.

Are the statistical methods valid and correctly applied? (e.g. sample size, choice of test)
   Yes.

If relevant, are the methods sufficiently documented to allow replication studies?

Yes.

Are the data underlying the study available in either the article, supplement, or deposited in a repository? (Sequence/expression data, protein/molecule characterizations, annotations, and taxonomy data are required to be deposited in public repositories prior to publication)
No.

Does the study adhere to ethical standards including ethics committee approval and consent procedure?
Yes.

If relevant, have standard biosecurity and institutional safety procedures been adhered to?
Not Applicable.

Q 5 **Please provide your detailed review report to the editor and authors (including any comments on the Q4 Check List):**

The work provides an innovative study in the use of 3D visualisation to support understanding and skill development for the student learning experience with an emphasis in petroleum geoscience. The manuscript also examines student feedback through a series of structured survey questions.
A key strength of the work is that while 3D visualisation is becoming more commonly used in education and skill development to supplement field teaching, the number of publication on this topic is very limited. The addition of a the review of student experience is also of value.
In terms of suggestions to improve the work:
1. One key finding, is that 3D visualisation can offer a multiscale and multivariate approach to education and skill development, especially for subsurface characterisation.
This could be emphasised in the study with more examples in terms of the different data used and 3D visualisation can assist in this important aspect.
2. The limitations are that the study appears to use commercial software under an educational licence – this limits the opportunity for others to replicate or use the study in future educational needs.
To increase the usefulness and impact of the study, the transferability of the work and findings could be highlighted and strengthened, including the opportunity to use equivalent openly accessible software.
3. The transferability to other areas of geoscience (petroleum geoscience is becoming less acceptable and limited) could be emphasised – multiscale and multivariate subsurface characterisation is very relevant to other geoscience fields – this could be emphasised and developed.
4. The authors do not comment on the opportunity to combine with analogue fieldwork sections or lab (core analysis etc) work. One criticism of 3D visualisation is that it takes students away from fieldwork – the authors could comment more on the value of combing with field experience or stress the issues where this is not possible in subsurface investigation.
5. Minor spelling and grammatical errors (see attached file)
6. Some parts of figures are not clear due to size, please check issue of copyright and ensuring student anonymity in some figures (see attached file).

QUALITY ASSESSMENT

Q 6 Originality — ■■■■☐

Q 7 Rigor — ■■■☐☐

Q 8 Significance to the field — ■■■☐☐

Q 9 Interest to a general audience — ■■■☐☐

Q 10 Quality of the writing — ■■■☐☐