



MPT1113
Foundations of Educational Technology
Assignment III

Journal Article Critique

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Kearney, Matthew (2006). Prospective science teachers as e-learning designers. *Australasian Journal of Educational Technology*. 22(2), 229-250

Purpose of the study

It was made clear in the abstract of the study that this study investigates the efficacy of prospective teachers authoring and using their own online learning designs as a means of creating links between theory classes and their teaching practicum. 'Learning designs' is a coordinated set of online activities designed to support conceptual change among learners. However, the title of the study is not completely clear. It does not clearly show the purpose of authoring and using e-learning designs for teachers. Furthermore, it does not mention the use of these designs, though – in achieving the objectives of this study – the use of the designs in teaching is given an equal importance as authoring. Perhaps a better title would be *Prospective science teachers linking theory to practice through authoring and using e-learning designs*.

In the introduction Kearney states plainly that he uses the learning design *predict-observe-explain* strategy supported by multimedia to facilitate a range of teacher learning outcomes in the context of prospective science teachers. This strategy involves learners predicting the result of a demonstration and discussing the reasons for these predictions, observing the demonstration and finally explaining any discrepancies between their predictions and observations.

To a good extent the abstract of the study was representative of the article, and in the correct form. Who reads it can understand the overall purpose and method of the study. Moreover, the purpose of the study was made clear in the introduction.

Problem addressed by the study

According to the researcher, pre-service science teachers study a variety of constructivist learning principles and strategies in theory classes at university, and are exposed to an increasing range of exemplary online learning designs in their studies. However, he reported that they often struggle to implement theory into practice and there is good evidence that when faced with the hectic demands of everyday teaching duties, they revert to more traditional didactic teaching methods. Furthermore, he adds that their design of online activities tends to be pedagogically shallow and content driven. This study investigates possible ways of improving this situation.

The study stated direct clear questions to be answered. It aimed to explore the following main research question: To what extent does pre-service teachers' authoring and use of an online learning design enhance their development as teachers? Moreover, subsidiary questions included: To what extent do they develop their pedagogical, technical and science content

knowledge? To what extent is their understanding of the sample learning design (POE strategy supported by multimedia) enhanced?

The study deals with an objective which is important in the field of education which is teacher preparation programs. Partially it is investigating how teachers authoring of their own teaching materials can enhance their preparation as teachers. And this is an issue which is focused upon recently. It also looks at their use of materials of their own design and how it affects their professional development which is an important issue as well.

Hypothesis followed by the study

In this study, learning was viewed from a constructivist perspective. Constructivism suggests that learners actively construct (rather than acquire) their own knowledge, strongly influenced by what they already know. Learning is a social process of making sense of experience, constructing new representations of reality and further negotiating meaning through social activity, discourse and debate.

The Design used in the study

The (POE) design has been used widely for over two decades as an assessment tool to probe learner's conceptual understanding and more generally as a tool to encourage quality peer learning. This strategy involves learners predicting the result of a demonstration and discussing the reasons for these predictions, observing the demonstration and finally explaining any discrepancies between their predictions and observations.

The study points out that the strategy is well researched (eg. Champagne, Klopfer & Anderson, 1980; Gunstone, 1995; Liew & Treagust, 1995). One of the researchers is Palmer's (1995) who investigated the process of prospective primary school teachers creating their own (non computer based) POE tasks to use as teacher centred, classroom based learning activities. He reported that the prospective primary teachers found the strategy to be a potentially useful formative assessment tool for their teaching.

It is worth highlighting here that the amount of literature the author reported is reasonable in terms of applicability and in terms of its amount. This is something which supports the reliability of the study. The possibility of finding the same results when redoing the study in similar circumstances and for a similar sample is reasonable.

The sample in the study

The prospective teachers involved in the study are fourteen prospective primary teacher participants who had completed several one-month teaching practicum in primary schools and had also completed science method subjects and seven prospective secondary teacher

participants who had completed one teaching practicum and were in the process of completing their science method subjects.

Approximately one half of the 21 participants indicated they had limited experience with computers. The variables mentioned above were not taken in consideration in the study. Therefore, the findings of the study were generalized on elementary plus secondary prospective teachers and were generalized on prospective teachers who have less experience on computers plus those who have more experience.

Moreover, the study focused on science prospective teachers. Therefore it cannot be simply generalized for other domains. Prospective teachers of other domains need separate studies. The sample used in this study, 21 prospective teachers is relatively small which negatively affects reliability.

The method in the study

In this study the student teachers were given one whole semester to design and create their own multimedia based POE tasks before using them in a primary or secondary classroom during their practicum. The design process included consultation with appropriate science education literature and also with relevant syllabus documents. Student teachers used a web authoring package of their choice (eg. *Dreamweaver* or *Frontpage*) to build their tasks. They were required to write a rationale for their task designs and these were collected as data to probe how well student teachers had used existing literature to inform their designs. Semi-structured interviews took place with teachers after this construction phase and they also completed a questionnaire at this point.

The next phase of the study took place during the student teachers' practicum when they used their web based POE tasks with small groups of school students. Semi-structured interviews were again conducted with focus groups of student teachers after this implementation phase and they completed a final questionnaire containing free response questions and 5 Likert type items (A Technique for the Measurement of Attitudes. Research has generally confirmed the fact that the Likert-type attitude scales are quite reliable and valid instruments for the measurement of attitude).

The researcher used an appropriate method and study design to find answers for the problems of the study. Data was collected using questionnaires, focus group interviews, observation and collected documents and artifacts. Different ways of collecting data gave a good chance for the researcher to get valid data from the study. Through comparing the findings of different tools he was able to justify true results and reduce the interference of chance. As a result supporting the validity of the study in measuring and answering the intended problems.

The period of the prospective teachers' involvement in the study is not very clear. Is it one semester or two? In the beginning the author pointed out that the student teachers were given one whole semester to design and create their own multimedia based POE tasks before using them in a primary or secondary classroom during their practicum. Afterwards he added that the next phase of the study took place during the student teachers' practicum. Was the practicum in the same semester?

The researcher aims at developing trainee teachers pedagogical and science content knowledge with ICT teacher competences through involving those trainee teachers in authoring online learning designs and through using these designs during their teaching practice with small groups of school students.

Major conclusions

According to the researcher, findings from this study indicate that student teachers' immersion in well researched, exemplary online learning designs may indeed help them bridge the gap between their university theory classes and practicum experiences. Trainee teachers in this study successfully designed their own online tasks using a sample, quality learning design (POE strategy supported by multimedia) and in the process, developed astute insights into the affordances and constraints of this design and also its underpinning constructivist learning principles. They extended their knowledge and sensitivity to the subtleties of children's learning processes, including their value of listening to children's personal views and the benefits of children's peer conversations. The whole design and implementation process helped the prospective teachers to review and clarify their own content knowledge and also develop better attitudes to and understandings of the role of technology in supporting learning.

The References

The issue discussed in this study is relatively new. Extensively, the researcher included a list of twenty five references. However, three of the references are comparatively old and this does not get by with the fast advancement of technology and education especially that in most cases newer studies usually report older studies if they are related.

The three references are: Champagne, A., Klopfer, L. & Anderson, J. (1980). Factors influencing the learning of classical mechanics. *American Journal of Physics*, 48(12), 1074-1079. , Erickson, F. (1986). Qualitative methods in research on teaching. In M. Wittrock, (Ed), *Handbook of research on teaching* (pp. 119-161). New York: Macmillan. and Lincoln, Y. & Guba, E. (1985). *Naturalistic inquiry*. Newbury Park: Sage Publications.

Conclusion

In the overall, the study we are concerned about here does build on current interest in online learning designs by investigating their potential role in teacher education. In addition, it offers possible ways of resolving the resilient nature of student teachers' beliefs that shape their (face to face and online) classroom practices through fulfilling the need of student teachers to provide them with opportunities to discuss and reflect critically on these beliefs.