

Helmut LINNEWEBER-LAMMERSKITTEN, Basel, Marc SCHÄFER, Grahamstown, Duncan SAMSON, Grahamstown

VITALmaths – Learning in Context („VITALmathsLIC“)

This project, which is a collaborative initiative between the PH FHNW in Switzerland and Rhodes University in South Africa, rests on the foundation of the VITALmaths project 2010-2013 (cf. Linneweber-Lammerskitten, Schäfer & Samson, 2010; Linneweber-Lammerskitten, 2009; 2011a; 2011b). The research associated with the latter focussed mainly on the development of a bank of online videos clips and the opportunities they offered for the mathematics teacher as interesting and appropriate teaching devices and tools to be used in conjunction with computers and mobile technologies such as tablets and mobile phones (cf. YouTube: “VITALmaths” and “linnemath”; facebook: “VITALmaths”). In this new project we would like to shift the research emphasis of the original VITALmaths project from the *development and teaching* of the videoclips, to *the learning process* that the video clips can support and enhance. The new VITALmathsLIC project envisages foregrounding how learning can take place in different learning and contextual spaces with particular reference to communication and language. In conjunction with this we would also like to develop additional video clips in such a way that they utilize accompanying resources such as worksheets and manipulatives.

In order to research this we would like to design teaching and learning support and scaffolding materials (such as “Arbeitsaufträge”, worksheets and manipulatives) to align with the existing and the newly developed bank of video clips. The three underlying themes and associated research questions that would then frame the VITALmathsLIC project are:

1. Communication

Overarching question:

- How can our video clips and materials be used to enhance learning in a collaborative and social milieu?

Specific questions:

- Within the context of collaborative learning, what is the nature of this learning when learners use the video clips in groups?

This research question could frame a possible research design that involved selected participants working in groups on specific activities. These interactions would be audio-visually recorded and analyzed, either by the re-

searcher and/or collaboratively with the participants, using schedules to highlight specific nodes of activity that enhance learning. A pre- and post-test design could be used to determine learning development.

- Do the video clips encourage learners to ask questions of each other, as opposed to asking the teacher?

This project could possibly be located within a classroom context where interactions are audio-visually recorded and documented. The analyses would be based on emerging themes that would determine the coding process of the data.

- Do the video clips provide a platform that enables learners to justify and articulate their own mathematical reasoning?

This project would specifically involve individual learners who would be interviewed and tracked over time to access and document their cognitive processes. A think-aloud protocol would be utilised to this end.

2. Mathematical language and discourse

Overarching question:

How can the video clips and materials enhance mathematical learning through encouraging an appropriate mathematical discourse and language?

Specific questions:

- When learning in the social milieu of the classroom, while engaging with the content of the video clips, do the learners make use of appropriate mathematical language and/or discourse?

This project would rely on audio data, of learners in a classroom environment, coded according to language content and usage. Once again a pre- and post-test strategy could be employed to measure the development of the use of mathematical language.

- Do the video clips encourage the use of correct mathematical terminology?

Once again, the data obtained from interviews and observations of selected participants engaging with the videos in their classrooms (or outside this environment) would be coded according to appropriate mathematical themes.

3. Manipulatives

Overarching question:

- How can the video clips and materials encourage the use of physical manipulatives to enhance learning?

Specific questions:

- Do the video clips provide appropriate motivation for learners to explore mathematical ideas through the use of physical hands-on artefacts?

This research project lends itself to using questionnaires and focus-group interviews to explore how the videos encouraged selected learners to use physical manipulatives in conjunction with the videos to investigate mathematical ideas.

- Do the physical manipulatives in the video clips enhance visual reasoning?

The data for this project would be generated through the use of worksheets and interviews where learners would be required to engage with activities that lent themselves to a visual and/or abstract engagement. This engagement would be analysed and characterised in terms of the extent to which it incorporated visual reasoning.

- How do the physical manipulatives in the video clips enhance visual reasoning?

This project would be similar to the one above, but the analysis would be more nuanced in terms of characterising the nature of the visual reasoning. This process would involve a detailed focus on specific nodes of activity that were rich in visual reasoning.

- Do the video clips encourage independent mathematical exploration through the use of manipulatives?

This project could possibly be framed outside a classroom situation involving selected learners provided with our databank of video clips. Semi-structured interviews would be used to assess the degree of autonomy and independence experienced by the learners specifically with regard to mathematical exploration.

It is envisaged that 4 Masters students will be recruited (2 in SA and 2 in CH). Each of the students will be assigned to one of the research questions above. In addition, post-doctoral research will be conducted in South Africa and in Switzerland. This will also include the co-ordination and the production of new video and scaffolding material referred to above.

The research orientations of our individual research projects are mostly underpinned by an interpretivist paradigm whereby we are committed to un-

derstanding the phenomena we are researching and interpreting within the social and cultural context of the participants. This implies a mostly qualitative research approach in which we employ in-depth case study research designs. Although the individual case studies shed light on specific and individual experiences, they form the basis for a broader understanding of learning with said technologies. Their collective contributions will provide rich evidence to answer our three overarching research questions. In all the projects a pre- and post-test design will be employed and quantitative approaches will be used in those parts that require statistical analyses. Further, the research design will contain elements of action research, whereby the findings of the research will continuously feed into the refinement of the design of newly developed video material. The project is committed to the principle of making educational materials and media available to learners free of charge, particularly in areas of impoverishment and compromised access to information, such as the rural areas of Southern Africa. Further, the project is committed to broadening access to quality material – this includes access in terms of language and culture.

There is still a need for scientific results concerning the implementation of National Educational Standards and competence-oriented teaching and learning in Mathematics – particularly with respect to communication and language. The anticipated research results will *inter alia* fit into the wider field of “language in all subjects” and “Language in Education – Language for Education” of the European Council’s Language Policy Division and will also be fruitful for corresponding research in South Africa – particularly regarding multilingual education. Our project will also have direct impact on the understanding of teaching and learning with mobile devices and the use of manipulatives.

References

- Linneweber-Lammerskitten, H. (2009): Der Einsatz von Kurzfilmen als Einstieg in Experimentier- und Explorationsphasen In Beiträge zum Mathematikunterricht 2009, Münster: WTM-Verlag, 743-746
- Linneweber-Lammerskitten, H. (2011a). Der Lernstick als Hilfe zur Binnendifferenzierung im Mathematikunterricht. In Grunder, Hans-Ulrich (Hrsg.) mLearning in der Schule. Der Lernstick als Lerninstrument. Baltmannsweiler: Schneider Verlag Hohengehren. 75-84.
- Linneweber-Lammerskitten, H. (2011b). VITALmaths – ein gemeinsames Forschungs- und Entwicklungsprojekt der Schweiz und Südafrika. In Beiträge zum Mathematikunterricht 2011, Münster: WTM-Verlag, S.555-558.
- Linneweber-Lammerskitten, H., Schäfer, M., & Samson, D. (2010). Visual technology for the autonomous learning of mathematics. Pythagoras, 72, 27-35.