

# **The application of the Universal Design for Learning framework to task design in order to support lower attaining children in the primary school mathematics classroom**

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## **Background to the study**

It is a requirement that all schools in Ireland administer standardized attainment tests in mathematics when children are in 2<sup>nd</sup> Class (aged 7 – 8). On the basis of these results, children who are deemed to have underperformed nationally (Standard Score <90), are usually offered additional support by means of withdrawal from their mainstream classroom for mathematics lessons to work on a complementary program with the learning support teacher. Although it is argued that such provision is offered to less able children as they tend to simply ‘give up’ in classrooms in which they find the mathematical tasks too challenging, the concern is that that these children will fall further and further behind. It is the contention of the authors, that it is not the tasks per se that are too challenging for the children but rather the nature of the tasks, which all too often tend to emphasize traditional practices of rote procedure and drill.

In this study, the researcher, who was working as the learning support teacher, and the class teacher planned together to integrate children back into their classroom by co-designing mathematically rich tasks. Over a four week period, three children who had formerly been withdrawn from the classroom were put to the fore in the planning of the tasks. Particular consideration was given to their learning styles. The mathematical tasks were inspired by the three key principles of the educational framework, Universal Design for Learning (UDL), which constitute Multiple Means of Representation; Multiple Means of Action and Expression; and Multiple Means of Engagement (Rose & Meyer, 2000). The term ‘universal’ is particularly pertinent in the design of the tasks as they were developed in line with specific mathematical learning goals for ‘all’ learners from the beginning rather than implementing a standard ‘one size fits all’ set of tasks and differentiating the tasks to cater for the marginalized, less able children, at a later stage.

Therefore, in order to create learning tasks that will engage all children by design, this research sought to ascertain:

1. How can the principles of UDL be used to design mathematically rich tasks?
2. Do UDL informed tasks engage and support children of low-ability in mathematics?

## **Methodology**

This case study took place over four weeks with one class of 32 children for 45 minutes per day.

The children were aged between eight and nine years old.

It was a detailed body of work comprising collaborative universal lesson design on the topic of 'Measurement', implementation of lessons, critical analysis of tasks and peer review. Each lesson was assessed using an adapted scoring rubric developed by Spooner, Baker, Harris, Ahlgrim-Delzell and Browder (2007). Frequencies of different events were tabulated. Formal observational instruments were developed to recognize and discern certain types of behaviors such as children's degrees of engagement. Observations were supplemented by photographs. Teachers' daily reflections were analyzed using the analytic technique of pattern matching. A matrix of categories was developed and evidence placed within each classification. Information was put in chronological order. A follow up interview was held with the host teacher at the end of the intervention.

## Results

The 14 lessons scored 82 points out of a maximum of 84 points on the adapted scoring rubric (Spooner et al., 2007) implying that a very high level of the UDL approach was used in the task design and implementation. Diversity was the starting point in planning the tasks, with lower ability children being accommodated within and enriching the regular class. The development of positive learning profiles for the three target children, such as, 'needs assigned role during group tasks', or, 'needs to have basic equipment available such as a pencil and a ruler prior to task allocation', helped to remove barriers to and enable participation in learning. UDL tasks offered the children various ways of acquiring information and knowledge; provided alternatives for demonstrating what they knew; tapped into children's interests, gave appropriate challenges, and increased motivation. Multiple means of representation, action and expression, and engagement were used in task design. Video clips were used on five occasions, concrete materials on eight occasions, ICT (PowerPoints, images, interactive stylus and interactive tools) were used during eight lessons, a parallel ICT mathematics program was set as homework for the children on each of the 14 days and the local environment was used on seven occasions. ICT was also found to be a key component that engaged children who were previously observed to be challenged by mathematics.

## Discussion and conclusion

This research revealed that tasks which take into consideration UDL instructional goals, assessments, methods and materials are usable and accessible from the outset rather than having to retrofit the tasks to children's needs as an afterthought. Crucially, results from this study found that by intentionally creating flexible learning opportunities, less able children were engaged and understood difficult mathematical ideas when they were provided with UDL informed tasks.

## References

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