Can Using Computer Based Simulation Activities in Traffic Safety Education Result in Student Behavioural Change?

Conrad Remenyi[1] (Presenter)
[1]**Department of Education and Training, Victoria**

Biography

BA, BEd, Grad Dip Computing Education, Grad Dip Urban and Regional Planning, Grad Cert in Education (Traffic Safety Education).

Conrad has 20 years experience teaching, co-ordinating and as a statewide VCE examiner. He has taught English, History, Work Education, Information Technology, Traffic Safety Education, Latin, Indonesian and Italian in secondary schools. Since 1995 he has worked within the Victorian Department of Education and Training providing policy advice to government, professional development and teaching & learning resources for teachers and principals. He is currently responsible for managing Traffic Safety Education in the Health, Physical & Sport Education Strategy.

Abstract
Does the use of computer-based simulation activities in the Traffic Safety Education classroom enhance teaching and learning outcomes? This paper examines the use of a number of CD ROM based resources in the classroom and describes how they may maximize the chances of effective teaching and the learning. The resources are traffic safety education products. The outcomes measured are safe road user behaviour and knowledge of risk. The paper makes some tentative conclusions about the contexts and pedagogy for the most effective use of these CD ROM based products.

1. INTRODUCTION

1.1 Aim

To make a preliminary investigation to identify the effects of using computer based simulation activities in the Traffic Safety Education classroom on learning outcomes and student behaviour. To identify if there was any difference between the learning outcomes of students who experience both simulated and real world environments and those who only experience simulated activities.

1.2 Apparatus

The data sources for this paper are knowledge test results and descriptive observation of student behaviour conducted by classroom teachers in late 2001 and early 2002.

The Traffic Safety Education resources used in the classroom and in which the simulation activities are embedded are VicRoads CD ROM based products:
- *RoadSmart* (for the primary schools)
- *Motorvation2* (for the secondary schools).

RoadSmart is a traffic safety education program that is designed to develop and encourage safe and responsible behaviour among young road users when walking, playing and travelling. *RoadSmart* incorporates a combination of school based learning sequences and

take home activities which involve parents in their children's road safety education. The *RoadSmart* package consists of:

1. Teacher resource books including take home activities:
- Book 1: Prep - Year 2
- Book 2: Years 3 and 4
- Book 3: Years 4 and 6
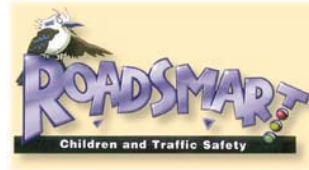
2. Discussion Posters:
Bus Safety is one of the road safety topics covered in the *RoadSmart* package. Posters from this package highlight key issues, which through discussion starters and teaching points, help teachers convey important road safety messages to students.

3. The CD-ROM combines graphics, sound, animated virtual reality scenarios and interactivity and:
- allows for self paced learning
incorporates problem solving, decision-making activities and games.
The activities include:
- *Maria and Grandad walk to school* - an electronic story for junior primary school aged children;
- *Albert and friends go to the movies* - an electronic story for senior primary school aged children;
- a quiz game - an exciting, fun reinforcement of key points from the electronic stories and road safety message. The quiz encourages parent/carer participation;
- a teacher and parent resource section; and
- a teacher information section.

Motorvation2 is an interactive CD-ROM that challenges both novice and experienced drivers with:
- road law and road craft quizzes
- on road decision making scenarios
- hazard recognition opportunities
- a crash investigation
- vehicle safety information
- a personal driver risk assessment
- Blood Alcohol Concentration calculations

Motorvation2 also challenges young people to:
- think about the complexity of the decision making required to be a driver or rider
- recognise potential hazards in the road environment
- appreciate some of the consequences of unsafe road use
- realistically appraise their skills and abilities as beginning drivers.

The resource consists of:
- a Teacher Resource book including over 30 lessons covering 19 road safety topics
- an interactive CD-ROM to be used by students in conjunction with the activities in the Teacher Resource or independently.

Both these products can be reviewed online at http://www.vicroads.vic.gov.au/, from the menu, under "About Roads, Traffic, and Road Safety" which is on the right hand side of the screen, click on 'Education and community' and then on 'primary education' or 'secondary education'.

2. METHOD

Traffic Safety Education Professional Development Leaders organized the selection of schools, oversaw the delivery of the simulation activities and arranged for the collection of data re test questions from the teachers. The Traffic Safety Education Professional Development Leaders also collected the observational data about student behaviour around the school on three separate occasions, once immediately prior to the delivery of the first lesson, once on the day after lessons were completed, and once much later. Pre-lesson observation, delivery of lessons, written testing and initial post-lesson observations were conducted in term 4, 2001. Later-post lesson observation was conducted on the first day of school in 2002.

Four schools were studied, in each of which two classes were used as the subjects for the study. All four schools were co-educational; two were Melbourne Metropolitan schools and two rural Victorian schools. In each of the rural and metropolitan regions, one school was primary and the other secondary. All classes had 25 students. The primary classes were all year five, the secondary classes were all year ten and the same teacher conducted each class and all tests at each school. In each school, both classes had Traffic Safety Education computer based simulation activities, but only one class also practiced the activity in the real traffic environment as well. All Traffic Safety Education activities and knowledge tests at each year level were otherwise the same.

3. TRAFFIC SAFETY EDUCATION SIMULATION ACTIVITIES

3.1 Primary

The simulation activity used was from page 8, 9 & 10 of the story for older primary aged students on the RoadSmart CD ROM. The activity screened a virtual traffic scene illustrating a bus stop. Students were able to scan the scene, invited to select the best location to cross the road after alighting the bus and offered options to select and respond to onscreen; also provided with an animated illustration of crossing the road correctly, which students could replay at will. One class also was taken to the school crossing outside the school and practiced crossing the road.

The essential lesson was pedestrian safety: how to cross the road safely by using the "STOP, LOOK, LISTEN and THINK" procedure. Students were subsequently administered a written, multiple-choice test on pedestrian safety issues. The students' use of the "STOP, LOOK, LISTEN and THINK" procedure was the activity to be checked by observation in the real traffic environment.

3.2 Secondary

The activity allowed students to take a simulation drive. One of the sections on the Motorvation2 CD ROM included going through the process of getting a licence, mapping a trip, and identifying hazards in the road environment. Each step was interactive and student driven, with selection of options and feedback directing the next selection requirements. Students were able to repeat actions at will until they responded correctly and then would proceed to the next task.

The following week, one class was also taken on a short demonstration drive on the real roads around the school and asked to make a commentary to identify the hazards along a defined stretch of roadway.

All students then completed a written, multiple-choice test on hazard perception.

4. THE NATURE OF SIMULATION ACTIVITIES

There are significant warnings about the value of simulation activities.

It is important to note that "pedagogies that apply in the classroom also apply in the computer lab" (Trickel & Liljegren 1998: 1).

Purely instructional teaching approaches tend to result in "transmitting facts, algorithms, and other information without showing their relevance to real-world activities,…students run the risk of accumulating "inert" knowledge, knowledge that cannot be used in practice and is easily forgotten" (Smith and Blankinship 2002: 1) or not seen as relevant to real life. It is critical that good pedagogy involves "constructing lessons that were occasions for .. students to investigate…and to investigate repeatedly" (Lampert 2001: 261). This often constitutes the rationale for selecting simulation activities!
Education reforms aim, instead of focusing on what students produce during/out of classroom activities, to train "students in the process of knowledge construction" (Richards et al 2002: 2). Simulation activities should therefore "provide them with computational and conceptual tools to help them detect patterns and explain the causal structure underlying these patterns" (Richards et al 2002: 2).

In this way simulation activities should provide students with rich and challenging contexts within which to explore and develop their own powers of observation, interpretation and understandings, but balanced with teachers' instructions – instructionalism and constructivism eliding (Kirshner 2002: 48). Any simulation activity (Gnanadesikan et al 1987) needs to be:
- stimulating and inspiring, encouraging questioning
- perceived as relevant to participant
- reflecting causal structures underpinning knowledge domains
- allowing for equivalent real environment decision-making
- participant driven and teacher directed.

5. RESULTS

5.1 Tests

This table shows the comparison between the overall average performances and standard deviations of the classes in their results on the multiple-choice tests. The classes a & c had no real on-road practice.

Rural	Average % Responses correct	Standard deviation	Metro	Average % Responses correct	Standard deviation
Primary (5a)	81	2.1	Primary(5c)	80	2.4
Primary (5b)	87	1.7	Primary(5d)	82	2.0
Secondary(10a)	73	2.2	Secondary(10c)	69	2.4
Secondary(10b)	73	1.8	Secondary(10d)	69	2.1

Note; a & c = classes with no Traffic Safety Education on-road experience in their programs

The classes that had real, on-road activities included in their programs in both the primary and secondary levels had generally higher average results and less standard deviation on the tests; except for the metropolitan secondary classes which had equal average results. Student responses in rural schools seem to be better than those in metropolitan schools.

5.2 Practical Observations of Behaviour

Traffic Safety Education Professional Development Leaders completed three days observation of students, documenting the behaviour of classes as they were dismissed in their class groups from school and went to cross the road outside the school. The first day was the day before the start of the school Traffic Safety Education programs; the second was on the school day immediately after the finish of the school programs; the third was on the first day of the following school year. They noted the number of students directly outside the school gates not using the school crossing to cross the road or using the school crossing incorrectly. They also made some anecdotal comments on the students' behaviour in this real road environment. Traffic Safety Education Professional Development Leaders were discreet in their observational behaviour. Students and parents/carers were not informed they were being observed on those days but had provided approval to be observed.

The classes that had real, on-road activities included in their programs in both the primary and secondary levels had generally fewer students not using the school crossing or using the school crossing incorrectly. This was quite a significant change in observed behaviour the next year, especially in the primary students.
However, in the case of the metropolitan schools:
- the primary class without Traffic Safety Education on-road experience saw a slight increase in poor crossing behaviour following the program and a marked increase the next year (see Traffic Safety Education Professional Development Leader observational notes below about parental behaviour)
- metropolitan schools had greater overall levels of incorrect road crossing behaviour (significantly poorer overall behaviour).

Rural	No. not using crossing or using the crossing incorrectly			Metro	No. not using crossing or using the crossing incorrectly		
	Before school program	After school program	Next Year		Before school program	After school program	Next Year
Primary (5a)	12	12	12	Primary(5c)	9	11	16
Primary (5b)	13	7	6	Primary(5d)	15	5	7
Secondary(10a)	10	9	11	Secondary(10c)	22	18	22
Secondary(10b)	10	8	8	Secondary(10d)	20	15	12

Note; a & c = classes with no Traffic Safety Education on-road experience in their programs

Some of the Traffic Safety Education Professional Development Leaders observational notes about poor crossing behaviour were:

Primary
- a group of 10 students launched an assault across the road
- 5 students on bikes rode across the crossing
- some younger students asked other students to hold their hands as they crossed, and they did

Secondary
- a number of adults failed to use the school crossing even though the crossing was fully staffed and being used by others
- some of the parents were calling the students across the road to their parked cars
- more girls used the crossing than boys

6. CONCLUSIONS

This study should be seen as preliminary, and would ideally be followed up with a more rigorous study. Nonetheless, some tentative, if not directional, conclusions are ventured as logically consistent with the findings.

Classes with Traffic Safety Education computer based simulation activities:
- resulted in slightly better Traffic Safety Education knowledge test scores
- are more effective in achieving changed behaviours if coupled with follow-up real world experiences in which the learning outcomes are practised.

The extent of the improvement in crossing behaviour of students with both simulation and real road user practice in the next year may be put down to observations being taken on the first day of school, when students are likely to be wary and on their best behaviour generally. Nonetheless, this improvement is paralleled by no such deterioration in the poor crossing behaviour by students without real road user practice. So, it may be suggested that, in the absence of other factors mitigating behaviour, use of simulation and real practice together may, in this instance, have a very positive long term effect on student crossing activities.

Within school programs real road user activities positively complement any simulation activity models to ensure that the chances for appropriate learning outcomes and their attendant behaviours are maximized.

It should be noted that the RoadSmart CD ROM has a component, with simulation activities, that is designed for the student to complete at home with parents/carers. There is an indication that student road crossing behaviour, especially at the secondary level, can be more significantly affected by peer group behaviour and parental behaviour than by the school programs. Students reacted to peer group behaviours and at the insistence and modeling of parents despite strong theoretical understandings of the appropriate behaviours. This study did not utilize this function of the CD ROM.

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