Road Safety Policy & Practice

Developing a Scaffolded, Structured Approach to Road Safety Education in Schools

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Key Findings

- School syllabus development and design are based on the principle of *scaffolding;*
- Scaffold-based programs of learning use the concepts of *scope and sequencing;*
- As children mature, their responsibility to apply skills and strategies can increase;
- An integrated scaffold in road safety is currently lacking in Australasian schools;
- An integrated road safety scaffold could enhance learning, skills and safety.

Abstract

Scaffolding is a well-established approach to education to maximise student learning outcomes. The premise of this paper is that there is a need for formal, scaffolded road safety education (RSE) which can be delivered in schools in Australasia. This paper supports the education system as being expert in matching human growth and developing scaffolds on which to build learning stages and presents arguments to show that an RSE scaffold can and should be drawn up. Schools can provide a structured in-class and real world learning experiences within that scaffold, which, with suitable communication, can be backed up by the home and the broader community. An integrated RSE scaffold across primary through secondary schooling is currently lacking in Australasia, but could be readily integrated in current school curricula. This paper calls for such developments and welcomes further debate and implementation of next steps to achieve this.

Keywords

Curriculum, Road Safety Education (RSE), Scaffold, School Education

Glossary

- Scaffold – a framework to guide teachers to encourage student learning and independence, using the concepts of scope and sequencing
- Scope – the breadth of learning
- Sequence – the order in which learning takes place

Introduction

School-age children are vulnerable road users. As passengers, pedestrians and cyclists they are exposed to harm due to their developing knowledge, skills and experience, propensity to distraction, short stature (lack of visibility to others) and, commonly, a lack of personal protective equipment (Congiu et al, 2008; also Twisk & Vlakveld, 2019). This includes, for example, underdeveloped ability to judge directions from which traffic is approaching, distance and speed of approaching traffic, and stopping distances. Compared to adults, they can act unpredictably, impulsively and have a limited understanding of road rules. It is generally recommended that children require adult supervision at least until the age of nine before allowing some independent walking and cycling in traffic-calmed streets (e.g., Congiu et al, 2008; RCH Melbourne, 2019). Beyond such early independent exposures, many children also will become drivers or riders of motorised vehicles before leaving school, with

some jurisdictions allowing moped riding from age 15½ years and car (learner) driving and motorcycle riding typically around age 16 (e.g., Department of Transport WA, 2020; Senserrick & Williams, 2015).

Skills involving an understanding of traffic movement, the use of the senses and decision-making are key to safely coping with the demands of roads and road-related areas and schools specialise in structured and age-appropriate teaching and training (Meir & Oron-Gilad, 2020; Zeuwts, Deconinck, Vansteenkiste, Cardon, & Lenoir, 2020). This is not only beneficial for developing academic skills such as maths and reading, but also for developing skills for life outside school, for example safe travel. Without a structured approach, children may find themselves learning about road use by trial and error in the real traffic environment that on the one hand is too complex and on the other hand too dangerous for the undirected accumulation of learning and experience, whereas guided learning which is both age and experience related learning offers a deeper appreciation of the dangers that road users of all ages face (Schieber & Vegega, 2002).

Recent moves in Europe have been to establish clear educational goals for schools in the area of road safety (ETSC, 2020) and those moves are relevant to the Australasian situation with both composed of high-income countries with similar community problems and possible educational solutions. The lessons in Europe include the need to establish a scaffold for RSE in schools which would identify the appropriate scope and sequence of road safety learning.

'Scaffolding' in the context of education can be considered narrowly as a technique to transfer knowledge from the teacher to student in a staged manner, such as with gradual examples, modelling and questioning that increasingly stimulate more independent thought by the student, such as during a given lesson (Firestone, 2016). Broader than this, Dickson, Chard and Simmons (1993, p. 12), for example, defined scaffolded instruction as "the systematic sequencing of prompted content, materials, tasks, and teacher and peer support to optimize learning". Attributed to early writings of Vygotsky (1978), scaffolding is a well-established educational approach shown to enhance learning outcomes (Jacobs, 2001; Kleickmann, Tröbst, Jonen, Vehmeyer, & Möller, 2015; Wood, 2001). Broader still, scaffolding can be conceived as applicable across a curriculum and across increasing years of schooling, with this latter conceptualisation a key focus of this paper.

The aims of this paper are to identify the need for formal road safety education (RSE) in schools across Australasia, to identify conditions for RSE to be effective and to argue for a scaffolded RSE curriculum. The following sections argue for an RSE scaffold by considering why the focus is on schools, current limitations in school road safety education curricula and how scaffolding might be applied, including examples and supports needed.

Why focus on schools?

Schools can provide structured in-class and real world learning experiences, which are soundly based on human growth and development principles and school education involves a triumvirate consisting of the school, the student and the broader community including the home (Alonso et al., 2020). This provides potential for RSE in schools and at home to follow human growth and development as students grow from being passengers, pedestrians and potentially also cyclists to drivers (e.g., Twisk, Vlakveld, Commandeur, Shope, & Kok, 2014). Safer road users, as expounded in the safe system approach to road safety (Tingvall & Haworth, 1999), is the overriding objective.

With the education system being expert in developing scaffolds on which to build learning stages, students using roads can be guided towards being independent and problem-solvers. By gradually shedding outside assistance, students grow through the stages of being passengers, pedestrians, and potentially also cyclists and licensed drivers; noting not all children will become cyclists or drivers, or progress in this order, and some might also become moped or motorcycle riders. A scaffold need not presume that all students will pass through all stages. Rather, a road safety education scaffold through the school years would not only aim to develop independent road use but also promote generalised personal responsibility in all road user categories within a developmentally appropriate timeframe.

Further contextual points are noteworthy here. Young people appear to be delaying driver licensure beyond school age, including in Australasia, albeit there are some corresponding reports of potential increased engagement in motorcycling (ITF, 2015; Thigpen & Handy, 2018; Wundersitz et al., 2015, 2018). There is an intentional lack of focus on early motorised riding in the remainder of this manuscript given its high-risk nature, generally discouraged prior to at least meeting learner driver eligibility requirements (e.g., NZTA, 2017). Notwithstanding this, the transferability of learning arguments also apply to motorised riding, and all elements of the RSE scaffold should be routinely monitored and updated with shifting trends, as per other school curricula.

Limitations of the current situation in the school education arena

Previous international evaluations and reviews have led to the conclusion that the potential effectiveness of RSE in schools is currently limited (Assaily, 2017; Twisk et al., 2014). In order to identify the current state of implementation in Australasian schools, a search for RSE syllabuses or other references was undertaken of the Australian Curriculum Assessment and Reporting Authority (ACARA) website (the independent statutory authority in Australia, which acts as a source that gives

advice on and the delivery of the national curriculum and assessment for education ministers), as well as the websites of each jurisdiction's education authority. First and foremost, specific documentation establishing an educational scaffold that relates human growth and development to learning about being a passenger, pedestrian, cyclist and driver was found to be lacking, moreover, the scope and sequencing of learning activities within an integrated scaffold.

Most Australasian schools were found to include some form of driver education program in later years (e.g., Road Safety Education, 2020), and have access to various resources via their local road authorities and police or other on-line resources for child passenger, pedestrian and cycling safety (e.g., Kidsafe, 2017; Raising Children Network, 2020), as well as various safe routes to school and cycling safety initiatives (e.g., Bikes in Schools, 2020). Irrespective of the format or quality of these resources and programs, they nonetheless are not presented as being part of a cohesive whole, but rather they stand alone and address particular issues; small parts of a bigger picture that lacks definition. Moreover, the base premise of scaffolding in curriculum design is that an adult teacher provides support to the student in order to facilitate learning and to assist in mastering tasks. As tasks are mastered, the instructor progressively transfers more responsibility over to the students, encouraging them to self-reflect and self-regulate their own behaviours. This integrated perspective was not identified relative to road exposures and behaviours.

For example, the approach taken in NSW, typical of many jurisdictions, is for RSE to be taught within Health, as part of the Personal Development, Health and Physical Education (PDHPE) syllabus (NESA, 2018). Whilst the syllabus identifies some key road safety issues, they are only set in the general context of safety, including mention of road safety and train safety examples within the same sentence (e.g., page 62). This is not a true cross-curriculum approach that would involve all school subject areas. The health and wellbeing of students is a core responsibility of every teacher, also known as duty of care and applies, for example, in the world outside of the school environment when taking students on an excursion.

Whilst there is no current integrated scaffold in RSE, there is much that could help shape it (including those abovementioned). There are ample resources that explain human growth and development and the implications for stakeholders in the formal schooling setting. In early years, for example, Piaget (1970) and Vygotsky (1978) developed theories along different lines, but viewed together gave a broad understanding of how learning in an RSE context can take place: whereas Piaget emphasised the child's exploration of their world and the discovery of knowledge, Vygotsky put greater emphasis on the sociological context of learning and creating opportunities for children to learn (MacLeod, 2018). Since the era of Piaget and Vygotsky our understandings of how children learn have advanced

as have teaching methods with the advent of electronics in the classroom such as access to the internet. Also, in recent times the concept of the 'school community' has increasingly come to include the home and its potential to contribute to school-based learning, including in the RSE context (DEEWR, 2008; Elkington & Hunter, 2003; NESA, 2018; NZTA, 2013; Waters et al., 2012). The principles expounded from the time of these early researchers and since have a role to play in the development of appropriate knowledge, skills and attitudes in the areas of being a passenger, pedestrian, cyclist and driver, which all need to be tied into a cohesive whole – the safe road user – with the wider context of the safe system.

The following points are notable in the Australian context, for example. At the Commonwealth level:

- There is no cross-curriculum scaffold in RSE and furthermore no specific reference to the exposure of school students' exposure to road danger as an integrated, cross-curriculum priority (ACARA, 2013a).
- Australian Professional Standards for Teachers (AITSL, 2017) do not specifically mandate road safety practice in the school environment or orientation of teachers in their pre-service training or in-service professional development.
- Student wellbeing is indeed a focus in Australian schools as is safety with a view to students reaching their full potential, as demonstrated via the national resource centre, the Student Wellbeing Hub (DESE, 2020); however, again, with no specific reference to road safety.

At the state secondary school level:

- Road safety is a mandatory concept in the Health Education syllabus as part of the general area of safety (e.g., NESA, 2018, see page 45). This implies that the only teachers that, of necessity, have formal training in the safety strand are the Personal Development Health and Physical Education teachers.
- Road Safety is implied in a range of traditional school subjects, for example Human Society and Its Environment and is already a part of the Science curriculum (e.g., Physics, ACARA, 2013b).
- Road safety is relevant also to the teaching of Mathematics, Engineering, Legal Studies, Geography, Commerce and English to name just a few.

At the state primary school level:

- Road safety is taught by generalist teachers who are not as highly trained in teaching safety as Personal Development Health and Physical Education teachers in secondary schools.

Limitations also result from the in-school structure. In the school situation, the day-to-day timetable is structured almost exclusively around group activities, which means

that the contribution of schools to RSE is limited in its ability to provide individualised training and sufficient practice in real traffic.

Implementing RSE as a 'whole-of-school approach'

Whilst there are the limitations as outlined above there are moves towards bringing traditional subject areas together in order to pursue a given theme. Experience in schools is showing that taking a 'whole-of- school approach' is more likely to have a positive impact in embedding and sustaining a positive impact across a range of outcomes (Alonso, Gonzalez-Marin, Esteban, & Useche, 2020; Bond et al., 2004; Cross et al., 2011). A whole school approach includes:

- developing a supportive culture, ethos and environment (in RSE, for what Alonso et al. define as PARK– Positive Attitudes to road safety, Risk perception and Knowledge of safe road rules, behaviours and norms);
- ensuring the scope of the students' learning is tuned to the needs and developmental stage of the students;
- sequencing of the teaching programs in accordance with each subject area's syllabus requirements; and
- proactive engagement with families, outside agencies, and the wider community.

There have been many developments in school education that combine the syllabuses of school subjects and are arranged in such a way as to have students from different year levels work together towards a common aim. One such example is the Science, Technology, Engineering and Maths (STEM) concept, with education authorities publishing their own examples for schools (e.g., NESA, 2020). Elements of each of these subjects already comprise reference to the road environment. Under the curriculum a school could have road safety as a STEM theme; for example, personal transportation and its relationship to the environment. Support for a whole-of community approach to RSE has been documented previously (e.g., Elkington & Hunter, 2003; SDERA, 2009).

STEM activities are arranged on a framework of scope and sequence which means that they are tailored to the students' experience and needs. In 2015, all Australian education ministers agreed to the National STEM School Education Strategy 2016–2026 (Education Council, 2015), which focuses on foundation skills, developing mathematical, scientific and digital literacy, and promoting problem-solving, critical analysis and creative thinking skills. That is, it was recognised that in order for STEM activities to be implemented an appropriate scaffold was needed and this has been established. The scaffold shows which activities can be carried out with the different ages and experience of the students. Within that scaffold the scope (extent) and sequence (order) of the activities are fixed. Schools are encouraged to engage with community resources in order to enrich the students' learning and experience. This model of educational organisation is a strategy that could be applied to RSE.

Nonetheless, tellingly, no such scaffold has been developed that takes the growing child from total dependence on parents/caregivers to complete independence as passengers, pedestrians, cyclists and drivers. As far back as the mid-1980s this lack of organisation was identified. In a report by Maggs and Brown (1986, see pages 71 and onwards), the authors were critical of the lack of structure and support for schools. Only recently, an expert panel under the auspices of the LEARN! Project in Europe supported by the Europe Traffic Safety Council established the role of school education in the area of road safety and how that role can be supported (ETSC, 2020). The lessons of that European paper include the need to establish a scaffold for RSE which would identify the appropriate scope and sequence of road safety learning.

Other successful health and wellbeing examples of scaffolding and the whole-of-school education approach are found in the areas of nutrition (Rowe, Stewart, & Somerset, 2010) with regard to suspension of students (Lister-Sharp, Chapman, Stewart-Brown, Sowden, 1999) and detailing the power of positivity (Fizzicseducation, 2020). All three of these areas have the potential to involve all students as does road safety.

The role of the home

The whole-of-school (the school, its students and the parent body) concept recognises that parents have a powerful role to play and, in the road safety sense, in supervising and stimulating the child's traffic experiences (Muir et al., 2017). The involvement of the family in mentoring their children has been demonstrated in research with young children and teenage drivers (Curry, Peek-Asa, Hamann, & Mirman, 2015; O'Toole & Christie, 2019). Overwhelmingly, parental involvement as mentors and role models also has the effect of refreshing their own knowledge and an appreciation of the challenges faced by their children.

To inform their mentoring, parents need to be made aware of their school's program in order to reinforce what is being learnt at school. There needs to be communication between the school and the home in order that the school's efforts in RSE can be followed up by parents/caregivers. The value of this approach was identified in Western Australia and guides for parents/caregivers have been published (SDERA, 2017, 2020). The guides aimed at parents mentoring their learner driver children provide a good indication of how to support children as they learn to use roads and road-related areas. Personal responsibility and a well-informed attitude form the basis of the driver mentor guide and the resources available outside the school system are clearly set out. The connection between the school's efforts and the home is thereby enhanced and this approach

can be applied to all stages of the education system. Such a mentoring approach would be appropriate also for the earlier stages of learning, that is, as passengers, pedestrians and cyclists; gradual and graduated learning.

The scaffold taking shape

Scaffolding in education is not a new concept and has been available since the 1960s and exemplified in guides for teachers (Firestone, 2016). The principles can be applied to RSE provided that an accompanying plan of scope and sequence is developed (see for example, SDERA, 2009). There is ample evidence of how humans grow and develop but the need is to apply it to RSE.

The creation of an RSE scaffold would show the interrelationship of the different classes of road user both in the learning sense and the real world. It would also plot the readiness of the child to progress from using roads totally dependent on parent/caregivers to full independence. Along the way the scope of the learning and the sequencing of experiences will be able to be plotted. Conceptually speaking, this scaffold would be built in much the same way as scaffolds that already exist for current school subjects which are all based on the readiness of students to progress from one stage to the next and which allow for the differing learning rates of the students. A major departure from the "traditional" scaffolds would be the inclusion of the role of the home.

Underpinning the scaffold's scope would be the development of students' knowledge of the road environment and road rules, the perceptual skills required for danger and hazard identification and positive attitudes towards students' increasingly independent road use.

There have been many studies that relate to human growth and development. Amongst the most succinct statements by a researcher are those by Roundy (2020) where she points to the general predictability of the stages through which humans pass, being infancy, childhood, adolescence and adulthood. The scaffold would plot the developing needs of the students as they move through experiences of being passengers, pedestrians, cyclists and drivers. At each stage, the students start out being totally dependent on adults through to being totally independent.

Evaluation of a student's progress would be an essential dynamic in the scope of the proposed scaffold and would be an indicator of what could be next on the sequence of learning for the student. Support documents aimed at teachers and families/mentors would need to accompany the scope and sequence section of the scaffold, which would guide assessors as to whether the student is ready to progress to the next stage of classroom and real world experience. Such scaffolding is offered as a desirable practice in all school courses in some jurisdictions (QCAA, 2018).

A transport-related example of this educational concept of scaffolding that can be used as an exemplar is one developed by Transport for NSW (2019) in order to educate parents/caregivers and children on safely using Sydney trains. That program recognises the role that adults play in the process of children learning about the dangers posed by travel on the public transport network and the growing independence of children until they have sufficient maturity and experience in order to travel independently. Successive resources are provided for pre-school, primary school and secondary school students.

Examples of an RSE scaffold to enrich the current curriculum

At the primary school level, an RSE scaffold would be established, centred around learning how to be a safe passenger, pedestrian and cyclist. In secondary education, deeper understanding of a road user's rights and responsibilities are age appropriate, including road rules and legal implications for preventing harm to oneself and others when sharing the road.

A common current perception is that the school curriculum is overcrowded, that it has too much built into it and that schools are being asked to do too much (Hunter, 2018). If RSE were woven into the delivery of traditional school subjects, beyond a specific current focus in PDHPE, it would give real world examples of concepts that are already being taught, not extra elements to be taught. Some indicative examples in other syllabuses include:

- In English:
    - At primary school – understanding age-appropriate road and roadwork signs, such as pedestrian crossing symbols and direction arrows;
    - At secondary school – levels of language – official as opposed to the vernacular;
- In Maths:
    - At primary school – relating speed to distance and time;
    - At secondary school – interpreting blood alcohol readings;
- In Science:
    - At primary school – how and why we wear seat belts;
    - At secondary school – forces at play in a crash;
- Legal Studies:
    - At primary school – the role of the police;
    - At secondary school – road users' rights and responsibilities.

To follow on from the discussion of STEM above, a more specific example of an integrated scaffold during the early secondary school years specific to the topic of seat belts could be:

- Science: forces at play in a crash and the role of seat belts in distributing forces and preventing secondary impacts;
- Technology: development and mechanisms of seat belts to manage vehicle forces;
- English: civil liberty arguments for and against seat belt wearing policies; and
- Maths: calculation of stopping distances as context to sudden stops and crash scenarios that create forces afforded by seat belts.

Next steps

The first step needed is to establish the RSE scaffold. An expert panel consisting of, for example, road safety authorities and researchers, education authorities, universities, education unions and practising teachers could be set up and be tasked with establishing the scaffold in RSE with supporting documents relating to scope and sequence and implementation of RSE in traditional school subjects. This process could be facilitated via Austroads, for example, and seek cross-jurisdiction agreement and adoption, as was undertaken for the STEM scaffold (as noted above). This has the potential to draw together and show the interrelationship of currently available resources in RSE, as well as update and refine to current advances.

Once this could be agreed and established within the curricula, teacher training would be essential. There is a place for road safety in the training for all teachers during their pre-service stage and the professional development of currently-practising teachers. This would sensitise them to the road safety role they can play in their day-to-day teaching and would allow them to deliver authoritatively road safety messages within the context of the lesson when opportunities arise in day-to-day teaching. This would multiply the educational opportunities for students to be exposed to RSE.

An RSE scaffold has the potential to not only draw together and integrate resources already existing, but also show areas in need of further attention. This would require the further development of key resources for teachers, students and parents/caregivers to round out the whole-of-school package and assist in its implementation. Such efforts would not necessarily need extensive new resources but overarching ways to connect and integrate those already available, yet currently fragmented. As noted above, an indication of what can be done in the area of programming that relates to children's growth and development is exemplified by the aforementioned Sydney Rail's teaching package (Transport for NSW, 2019) and this points to what needs to be done across the road safety curriculum. Other potentially suitable teaching resources are referred to in the Towards Zero document (NSW Government, 2018; pp 16-17, 27) and in European guidelines for resource development that have been published (AVENUE, 2020), as illustrative examples among many other existing resources demonstrating the ready potential for translation into practice.

Conclusions

To be effective, road safety interventions must be part of an integrated system, as opposed to the currently isolated strategies and RSE approaches, exemplified by Health Education being the major vehicle for RSE in the overall school curriculum.

Based on the safe system's approach to road safety and human growth and development, a learning program, a scaffold with inbuilt scope and sequencing covering all classes of road users – passengers, pedestrians, cyclists and drivers – needs to be agreed upon, promoted and implemented across all school levels and multiple subjects in order for RSE to have a truly effective role.

There is potential in sensitising all teachers to road safety as part of pre-service and in-service training and professional development across all stages and subject areas of school education. Part of this overall development can give parents and caregivers access to better resources and take an active part in the process of bringing students into the world of informed, independent road use.

The need and the will to improve road child and youth road safety in Australasia is unquestioned and requires multifaceted solutions. Establishing an RSE scaffold upon an already strong foundation of resources would strengthen the role that education can contribute to continuing efforts to reduce road trauma.

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