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Dear Alison

### **Consideration of Petitions PE1098 and PE1223**

I refer to your letter dated 26 January 2011 to the Chief Executive of Aberdeenshire Council, seeking a written response on the issues raised in the above petitions and specific issues raised during discussion on the petition at the meeting on 25 January 2011. The specific question I am replying to is:-

*"Can I refer you to the discussion during the meeting, in particular to the point made by Nanette Milne with regards to the report you have just completed on the trial that you have been running on school bus signage? The Committee would be grateful if you could provide it with an update on the trial."*

I can confirm that Aberdeenshire Council's trial of new school bus signs revealed positive results and I have pleasure enclosing a short report that outlines the results from the trial in full detail. This report has also been provided to colleagues at the Department for Transport and the Scottish Government, and it is our understanding that Scottish Government colleagues are considering potential opportunities to roll out the new signage across Scotland, supported by a national awareness campaign. I trust the Committee will find this report of interest. In addition to the report, a short summary is provided below.

The new signage was launched on school bus services at Meldrum Academy on 5 November 2009 and has been evaluated as part of a trial ongoing to July 2010. A robust evaluation was undertaken during this period which included:-

- o Motorist Questionnaires;
- o Motorist Behaviour Surveys using speed surveys to monitor speeds of vehicles passing a bus in a lay-by displaying no signs (day one), the existing school bus sign (day two) and the new trial school bus sign (day three); and
- o Bus Driver Questionnaires.

The Motorists' Questionnaire was completed by 911 respondents with results overwhelmingly positive with regards to views on the visibility and comprehensibility of the new sign compared to the existing sign. For example, without being informed that the survey was in relation to school bus signage (respondents were simply informed they were taking part in a road safety survey), respondents were posed questions on a) whether they had seen the existing and trial school bus signs before, and b) what they understood the signs to mean. The results revealed that while substantially higher numbers of respondents stated that they had seen the existing school bus sign (70.6%) compared to the new school bus sign (37.5%), a much higher proportion of respondents correctly identified that the new signage meant 'School Bus' (79.4%) compared to the existing sign, which was correctly identified as meaning such by just over 40% of all respondents.

The results from the Motorists' Behaviour Surveys were generally inconclusive. While no trends were identified with regards to the impacts of the new front school bus signs, the trial rear signs appeared to positively reduce vehicle speeds of passing motorists' compared with the data gathered on the day that the existing sign were on display. However, given that speed reductions were only in the region of 1 mph to 3 mph, it is considered that any impact is relatively negligible.

In terms of the bus drivers' questionnaire, in total 13 completed questionnaires were returned from bus drivers who carried the new school bus signage as part of the trial at Meldrum Academy. The findings appear promising, with 67% of drivers stating that they had noticed a positive change in how motorists drove in the vicinity of their bus whilst carrying the new school bus signage, although the low numbers involved in the survey should be acknowledged. The most common change that bus drivers had noticed following display of the new signage on their vehicles was a reduction in motorists' overtaking the school bus while it is picking-up/dropping-off pupils (87.5%). Other positive changes noted by a majority of drivers included 'more careful driving in the vicinity of the school bus' and 'reduced speeding in the vicinity of the school bus' (both noted by 75% of drivers).

In terms of work going forward, as a result of the positive trial, Aberdeenshire Council is currently in the process of rolling out the new signs on school bus services contracted across the region. Resources permitting, we are aiming to have all school bus services in Aberdeenshire fitted with the new signage by the beginning of the summer term in August 2011.

I trust this information is of interest and would refer you to the enclosed report for more detailed information on the results from the trial.

Finally, I thought I would also take this opportunity to comment on another question posed to Scottish Government colleagues by the Petitions Committee. Specifically, in response to a question from the Petitions Committee of 15 March 2010 in relation to lessons learned from the 1Second1Life learning activity/campaign produced by Aberdeenshire Council and our partners, I would offer the following.

'Bus Stop!'/1Second1Life is an interactive learning resource pack which includes a film entitled '1Second.1Life', a booklet for teachers with lesson plans for pupils from Primary 1 to Secondary 6, and other material to help deliver the road safety message. The campaign is themed to increase the safety awareness of young people using public transport and focuses in on the distractions which can have tragic consequences, such as MP3 players and mobile phones.



An electronic version of the teaching pack and its accompanying films are available from the dedicated 'Bus Stop!' website – [www.1second1life.co.uk](http://www.1second1life.co.uk). Following the launch of the pack in February 2009, it has been rolled out in schools across the North East and promoted to other local authorities encouraging its adoption nationwide.

The campaign is yet to be formally evaluated, however, reports from schools have been extremely positive. On viewing the DVDs in a classroom scenario, "complete and utter silence" is initially the most common reaction amongst pupils, followed by considerable discussion. While the majority of schools concentrate the showing of the DVDs to P7/Secondary 1s and 2s – statistically the most at-risk age group – a number of schools have already stated that they will provide repeat showings to pupils approaching driving age to encourage them to consider the films from a motorist's perspective. At the primary school level, some schools have also used the Bus Stop! Packs to develop their own road safety messages as part of School Travel Plans. In addition to being well received by pupils, the videos and website have stimulated wide debate, creating a strong viral effect online.

In recent months, Bus Stop!/1Second1Life has been extended, from being primarily an in-class learning resource pack, into a regional media campaign. Working with private sector partners, a 30 second TV advert incorporating key shots from the existing '1Second1Life' film was developed, allowing the message to be delivered not only to pupils but also to parents and motorists in the home environment. Thus far, the hard-hitting advert has been broadcast on STV approximately 50 times throughout the darker autumn and winter nights. The website has also been updated to include video messages on school transport safety from a range of local stakeholders (e.g. teachers, drivers, pupils, and emergency service personnel). Feedback on the campaign, the TV advert and website has been positive from all who have seen these media.

I trust the above information is useful but please get in touch should you require any further information.

Yours sincerely

**Ewan Wallace**  
**Head of Transportation**

Enc

c.c. Iain Gabriel, Director of Infrastructure Services  
Jim Anderson, Interim Director of Education, Learning and Leisure  
Bill Ross/Douglas Muir, SCOTS

## New School Bus Signage: Results from a Trial in Aberdeenshire



December 2010



## INTRODUCTION

Following the tragedies involving two pupils being fatally injured on Aberdeenshire's roads after alighting school buses in 2008, the Council has progressed a number of trials that seek to improve the safety of school transport services, including a trial of new school bus signage.

This research report describes the detail of the trial and presents the results from the evaluation undertaken on the new signage.

## BACKGROUND

In September 2008, two school pupils were fatally injured on Aberdeenshire roads in separate incidents after alighting school buses. In the immediate aftermath of the tragedies, the topic of school transport safety became the focus of significant political, public and media interest, and following a review of international research in this area, Aberdeenshire Council launched a number of initiatives to reduce the risk of such incidents happening again (Aberdeenshire Council 2008). Initiatives included the launch of the first UK trial of the SeeMe® interactive school bus stop technology and introduction of the „Bus Stop!“ education pack in Aberdeenshire schools.

In addition, consultations undertaken by the Council with school transport operators (Aberdeenshire Council 2008) revealed various concerns regarding the visibility and interpretation of the existing school bus sign. Concerns regarding its visibility related to the view that the sign was not very bright and was often lost in much of the other livery and logos on buses or placed behind tinted glass. Concerns over the interpretation of the sign centred on the view that not all motorists associated the sign's pictorial with school children and, therefore, school transport. Concerns were also raised from other stakeholders in relation to the inappropriate use of the sign ranging from some operators failing to show the sign at all to some failing to remove the sign when not carrying pupils to and from school. In particular, it was considered that the presence of the school bus sign on all types of buses at all different times (e.g. even when not carrying school children, such as on football supporters' coaches during weekends) actually diluted the effectiveness of the sign and leads to motorists failing to take care when travelling in the vicinity of school buses.

The limited research that exists on school bus signage also served to highlight confusion around its legislative requirements and appropriate use (Scottish Executive 2007, Thornthwaite 2009). Therefore, to work in partnership with the aforementioned initiatives, the Council, supported by the Scottish Government, undertook a trial of new school bus signage that has sought to address the concerns raised.

## LEGISLATION ON SCHOOL BUS SIGNAGE

Under the Road Vehicles Lighting (Amendment) Regulations 1994, buses and coaches used for journeys to and from school are required to display distinctive retro-reflective yellow school bus signs fitted to the front and rear of the bus (Scottish Executive 2003). Specifically, signs at the front of the vehicle must be at least 250mm x 250mm with the black border of not more than 20mm wide and at the rear of the vehicle at least 400mm x 400mm with a black border of not more than 30mm (Fawcett and Croner 1993). Each has a silhouette of two children in black on a yellow reflective background.



The regulations prescribe the minimum dimensions of the signage and thus larger versions may be used. The regulations also permit buses using the sign to display their hazard warning lights when children are boarding or alighting the vehicle, and permit an additional pair of hazard warning lights to be fitted to increase visibility. Additional warning signs are also permissible, such as illuminated signs reading "School Bus" or "Caution: Schoolchildren" etc. although there are regulations that have to be followed if developing such signage. For example, illuminated signs need to show a steady (i.e. not flashing) light and be red if showing to the rear and white (or in some instances yellow) if showing to the front. It is therefore possible for local authorities responsible for letting school bus contracts to stipulate specific signage conditions over and above the existing minimum requirements if they wish.

The purpose of the school bus sign and hazard warning lights "is to make other road users aware that when the vehicle is stationary children are likely to be getting on or off the bus and may be crossing the road. Other road users should, therefore, be very cautious when passing a school bus in those circumstances" (Scottish Government 2003). Arguments therefore follow that the sign should only be displayed when the bus is operating as a school bus, transporting pupils between their home and school, because its constant display at all times (i.e. when not carrying school pupils) actually dilutes the effectiveness of the sign. However, there is no statutory requirement to remove school bus signs from buses not being used to transport children to and from school, or to use hazard

warning lights when the vehicle is stationary and children are boarding or alighting. Instead, it is the local education authorities' responsibility to stipulate in their contracts with operators that the signs should only be displayed when children are being transported and that hazard warning lights should be used when children are getting on or off vehicles (Scottish Executive 2003).

## LITERATURE REVIEW

A background literature review undertaken prior to the development of the Aberdeenshire trial confirmed that while a wide range of school transport safety initiatives operate globally, on the whole, only limited research had been undertaken on school bus signs.

In the UK, research on school transport safety has tended to focus on the effects of safer routes to school, traffic calming, and active travel projects as opposed to school bus safety. UK literature on school bus signage simply serves to confirm that a high level of misunderstanding and confusion exists, both on the part of councils and school bus operators, about the legislative requirements regarding the display of school bus signage. As Thornthwaite (2009) highlights, the signs are "...widely misused (e.g. wrongly sized signs) or are left in place when it is evident that the vehicle is not being used by children" and the regulation surrounding the appropriate use of the sign "...appears to be widely disregarded and inconsistently applied, and it is doubtful today whether there is any benefit or change in driver behaviour around buses as a result".

At the global level, initiatives include the use of yellow school buses and legislation banning the overtaking of stationary school buses (in the US and Canada), speed limit enforcement around school buses (Australia and New Zealand) and the use of technology and safety assessment tools to improve pupil safety at school transport pick-up and drop-off points.

At the EU level, there is an emerging body of work on school bus sign conspicuity through the EU SafeWays2School Project which has reviewed a wide range of school bus signs from across the world, with an aim to develop a new sign for further development and trial. The review found that graphical representations of „children“, „running“ and „bus“ were common in the majority of the signs, but also identified that representation of the „children“ symbol varied from country to country (Egger 2010). The research concluded by recommending three key factors that would contribute to a more effective school bus sign: an emphasis on danger, clarity of the graphical content of a symbol, and a reduced number of graphical elements.

In Sweden, the Swedish National Road and Transport Research Institute have undertaken research into the effects of school bus signs incorporating flashing lights

on motorists' behaviour with one recent study suggesting that the school bus sign alone does not result in any change to drivers' behaviour, although flashing lights did have a positive effect. Anund et al (2005) tested road users' behaviour when passing buses at standstill displaying different forms of school bus signs on roads with speed limits of 50km/h and 70km/h respectively. Three different forms of school bus signing were tested: buses without any sign; buses with the existing school transport sign; and buses with the existing school transport sign equipped with blinking lights. Behaviour was measured in terms of motorists' traffic speeds and fixation patterns on buses. The study found that drivers meeting school buses did not lower their speed or increase their lateral position to the bus if it is marked only by the present school transport sign. If however the sign is combined with blinking lights, the drivers will decrease their speed and fixate longer on the bus and more often on it. The study also recommended that further school transport signs should have blinking lights and that the sign should be in another format with another type of icon than at present, which in turn required more research.

## DEVELOPMENT OF THE NEW SIGNS

In summer 2009, Aberdeenshire Council's Road Safety Engineering Unit set about the process of designing a number of new signs in consultation with the UK Department for Transport (DfT).

The signs developed for trial in Aberdeenshire have sought to address the concerns raised by the operators, and raise motorists awareness to the presence of school buses and, in turn, the possible presence of pupils boarding and alighting school buses. Key features of the new signage include:

- The use of high visibility reflective materials;
- Inclusion of the words „School Bus“, to increase understanding and awareness as to the presence of school buses and pupils potentially being picked-up and alighting in the area; and
- Chevrons to increase the visibility of the sign, assist in highlighting the pictogram and „School Bus“ font, and to make motorists aware that they are approaching a potentially dangerous situation.



The manufacture of the signs at larger dimensions was also considered important to increase the signs visibility. As an added benefit, it was felt that the use of larger, more prominent school bus signs could encourage bus operators to take down the sign when their vehicle is not operating as a school bus, particularly if it hides their livery / advertising.



At the front of the bus, it was more difficult to increase the dimensions of the sign owing to the lack of useable space to fix the sign to the bus, and a requirement that the sign does not obstruct the drivers view if placed in the windscreen. For this reason, a higher visibility version of the existing sign was the option taken forward for the trial.

To develop options for fitting the signs to the vehicles, site meetings were undertaken with the operators involved in the trial. At these meetings, the operators were provided with variations of the sign and suggestions offered as to how they could affix the signs to their vehicles. As far as possible, operators were encouraged to fit the signage to the outside of the buses, with hinged, bolted-on options recommended such that the signs could be folded away when not in use as a school bus. Anti-loose fasteners were also examined, as were sticker options on those vehicles which were only ever used as school buses. Regrettably however, it was accepted that for some buses, owing to their physical dimensions, the only suitable position for the sign was behind the window space.

#### DETAILS OF THE TRIAL

The new signage was unveiled at Meldrum Academy on the 5<sup>th</sup> of November 2009 with the trial running until summer 2010, allowing the signage to be assessed in a range of daylight and weather conditions.

Meldrum Academy, based in Oldmeldrum, Aberdeenshire, was selected for the trial as it has the largest proportion of pupils travelling by school bus in Aberdeenshire. A mix of operators also provides

school bus services to the Academy, which was advantageous in that the new signage could be piloted on a range of vehicle types. Nineteen school bus services operate to Meldrum Academy, with the new signage provided to each of the operators for the trial.



#### EVALUATION

##### Purpose / Research Objective

The key purpose of the evaluation was to investigate whether the new school bus signs being trialled in Aberdeenshire were more effective than the existing signs, in school transport safety terms, through increasing motorists' awareness to school buses and, in turn, the possible presence of school pupils.

Specifically, this study sought to examine if the new signage addressed concerns in relation to the existing signage and increased motorists' awareness levels to school buses in terms of their ability to better understand what the new school bus sign meant, and their views on its visibility. Research also established that many of the school transport safety initiatives implemented across the world have sought to improve pupil safety through reducing the speed of motorists in the vicinity of school buses and school zones. Findings in this regard have therefore also been taken into account in evaluating the effectiveness of the new school bus signage.

##### Methodology

To investigate whether the new trial school bus signs are more effective than the existing signs, in terms of improving school transport safety, through increasing motorists' awareness to school buses and, in turn, the possible presence of school pupils, a robust evaluation programme was developed based on:

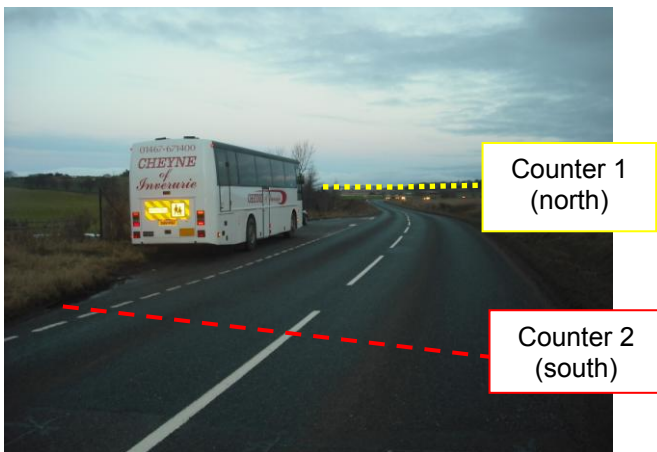
- Motorist Questionnaires;
- Motorist Behaviour Surveys; and
- Bus Driver Questionnaires.

The *Motorist Questionnaire* was based on the use of „before“ and „after“ questions using photos of the existing and trial signs, designed to investigate with motorists the extent to which they understood the



meaning of the signs and their views on each signs" effectiveness. The questionnaire was made available online and promoted through press releases, Twitter, adverts in the local press and on the Council's website and network of AbLive TV Screens.

The *Motorists Behaviour Survey* was based on the approach adopted in the Anund et al study (2005) and involved a controlled assessment to examine whether the new signage encouraged motorists to reduce their speed when passing school buses. Speed surveys were set up in the vicinity of a lay-by on the B9001; a 60mph road used by commuters travelling from the Rothienorman area of Aberdeenshire to Inverurie and Aberdeen City. Three types of bus were positioned in the lay-by: a school bus displaying no signage; a school bus displaying the existing signage; and a school bus displaying the new Aberdeenshire trial signage. The study was undertaken on three consecutive days in February 2010 and the bus was present at the site on each of these days during the peak AM, afternoon control, and peak PM periods. To assess the impacts of the signage on motorists" behaviour, analysis was undertaken of the speed data collected from speed radar devices (SDRs) set up in the vicinity of the school bus lay-by.



The *Bus Drivers Questionnaire* was developed based on the exploration of „before" and „after" scenarios with the bus drivers involved in the Meldrum Academy trial. Specifically, drivers were asked what (if any) problems they experienced on the school run, in relation to other motorists. This was followed by questions asking if they had noticed any positive change in how motorists drove in the vicinity of their bus following the introduction of the new signs, and what type of changes they had noticed.

## RESULTS

### Motorist Questionnaires

The Motorist Questionnaire was completed by 911 respondents with results overwhelmingly positive in terms of views on the visibility and comprehensibility of

the new sign compared to the existing sign. Without being informed that the survey was in relation to school bus signage (respondents were simply informed they were taking part in a road safety survey), respondents were posed questions on whether they had seen the existing and trial school bus signs before, and what they understood the signs to mean. The results revealed that while substantially higher numbers of respondents stated that they had seen the existing school bus sign (70.6%) compared to the new school bus sign (37.5%), a much higher proportion of respondents correctly identified that the new sign meant „School Bus" (79.4%) compared to the existing sign, which was correctly identified as meaning such by just over 40% of all respondents. Indeed, the questionnaire results revealed that a high proportion of respondents thought the existing school bus sign actually meant „Children Crossing" (30.1%) and „School Zone" (21.8%), which adds weight to the belief, first raised by school bus operators, that the general motoring public does not understand what the existing school bus sign means.

The survey results also indicated that 86.7% of motorists thought that the new trial signs were „definitely more visible" than the existing signs (11.3% said it was slightly more visible) while 64.5% of motorists thought the new trial signs were „definitely more understandable" (24.2% said it was „slightly more understandable").

Each of the design elements of the new signs were also commented upon favourably and thought to contribute to motorists" increased visibility and understanding of the signs. Specifically, „inclusion of the phrase „School Bus"" was ranked as „highly effective" by 68.9% of respondents, and „effective" by 17.6%. The use of „higher-visibility, reflective sign materials" was ranked as „highly effective" by 66.9% of respondents, and „effective" by 23.5%. Finally, the use of the „red/yellow chevron markings" was ranked as „highly effective" by 56.7% of respondents, and „effective" by 29.7%.

### Motorist Behaviour Surveys

The results from the Motorists" Behaviour Surveys were generally inconclusive. Speed data analysed for Counter 1, at the front of the bus, suggested the new front school bus signs made no impact to motorists" behaviour. This is unsurprising as although the new trial signs use higher-visibility reflective materials the front sign is still relatively small in size, and it is very difficult to increase this owing to regulations surrounding the fitting of signage. The speed data collected for Counter 2, at the rear of the bus, suggested the new rear signage had a minor positive impact in reducing the speeds of passing motorists. For example, speeds reduced by 1mph across the board (when compared against data collected on Day Two when the existing signs were on display), with the



only exception being during the afternoon surveys when speeds were found to have decreased by 3mph (5.8%). While it appears that the presence of the new, larger rear signage positively reduced vehicle speeds compared with the data gathered when the existing sign was on display, given the small speed reductions observed (1mph to 3mph), any impact is considered relatively negligible. A number of potential limitations identified with the Motorist Behaviour Surveys, related to the location of the lay-by and positioning of the speed counters, also contribute to this view that the overall results are inconclusive.

### Bus Driver Questionnaires

The Bus Drivers Questionnaire was completed by 13 drivers operating school bus services carrying the new signage as part of the Meldrum Academy trial. The questionnaire confirmed the wide range of problems that drivers regularly experienced on the school run, with the most common problems relating to “motorist’s overtaking without due care when the school bus is in transit”, “dangerous driving around the school bus” and “speeding around the school bus”.

It is therefore encouraging that many of the school bus drivers were positive about the signs having the desired impact, suggesting that the new signs have improved perceptions of safety on the school run. For example, 67% of bus drivers stated that they had noticed a positive change in how motorists drove in the vicinity of their bus whilst carrying the new school bus signage, although the low numbers involved in the survey should be acknowledged. The most common change that bus drivers noticed following display of the new signage on their vehicles was a reduction in motorists’ overtaking the school bus while it is picking-up/dropping-off pupils (87.5%). Other positive changes noted by a majority of drivers included „more careful driving in the vicinity of the school bus” and „reduced speeding in the vicinity of the school bus” (both noted by 75% of drivers).

100% of drivers agreed that the new signs were more visible and understandable to motorists than the existing ones. The majority of drivers also agreed that, in practical terms, the new signage was easier to take down than the current sign, despite its increased size.

### FURTHER RECOMMENDATIONS

Through the literature review, and lessons learned in undertaking the trial in Aberdeenshire, a number of further recommendations were identified which may usefully inform further studies in this area at the national level.

Firstly, it is considered that it could be interesting for national agencies to experiment with a further sign incorporating flashing lights. Recent studies in Sweden have recommended that further school transport signs should have blinking lights and be in another format with another type of icon than at present, which in turn required more research (Anund et al 2005). The findings from the Aberdeenshire trial suggest the addition of the phrase “School Bus” and some of the other design characteristics could address these recommendations around other “formats”. However, it could also be interesting to add flashing lights to investigate what further impact this could have. Indeed, the results from the Motorists’ Questionnaire revealed high levels of support for flashing school bus signs with significant numbers of respondents suggesting that “high intensity flashing LED lights” should be added to the sign. The literature review highlighted that “one disadvantage of any permanently displayed sign is drivers, many of whom would pass the same sign regularly without requiring any action in response to it, tend to ignore it or fail to see it... Active signs incorporating flashing lights and/or lit (LED) components which are displayed only when relevant... heighten the visibility of these signs compared with standard (non-flashing) warning signs thereby enhancing driver awareness of risk” (New Zealand Transport Agency 2002). It should be noted however that there are more stringent regulations around the use of flashing lights on transport signs which would need to be worked through with the DfT. It is also anticipated that the costs of these signs would be substantially more than the Aberdeenshire trial signs. Nonetheless, in light of the strong feedback on this, this is an area that could warrant further consideration.

Secondly, the need for clearer guidance on the appropriate display of school bus signage, and the introduction of legislation that makes it illegal to display the sign when not operating as a school bus – and importantly enforcement of this legislation – is a further



recommendation of this study. The research undertaken has confirmed there is a high level of confusion around school bus sign legislation (Scottish Executive 2007, Thornthwaite 2009). As the Scottish Executive (2007) state, "the legislation, guidance and practice surrounding school transport have grown up through a variety of routes" meaning "...it is not always readily possible for a lay person to understand and interpret what should be provided and why. The result of this confusion is evident in some of the ill-informed debate which takes place between authorities, parents and the media." It continues, "While some authorities have sought to overcome this confusion by giving information to parents using written material, or face to face at open days, others do not appear to have clear policies in place (for example, on seatbelts and penalties for the inappropriate display of school bus signs) or fail to inform their staff of these policies".

Thirdly, a point of good practice which should be promoted if any further signage trials are taken forward is the involvement of school bus operators and drivers. The positive feedback and engagement with bus drivers was a particularly encouraging finding of this study, and one which can be attributed not only to the obvious improvements to the school bus signage but also by the process by which the signs were produced; notably the early consultation with school bus operators and the development of a culture of joint-working and shared responsibility.

As a final recommendation, or point for further consideration, while this study has suggested that the school bus signage trialled in Aberdeenshire can potentially contribute to improved pupil safety, a whole range of other measures covering the full spectrum of the "five „E"s" – Education, Engineering, Enforcement, Encouragement and Engagement – are required to more fully address school transport safety issues. Where school transport safety is concerned, Aberdeenshire Council have promoted the message that everyone has a role to play (pupils, parents, schools, bus operators and motorists) and a holistic approach is required to improve the safety of home-to-school transport services in acknowledgement that there is a whole toolkit of measures that can be called upon. Therefore, going forward, it is recommended that improved school bus signage should be implemented as part of a package of measures covering the "five E"s" to increase awareness and reduce speeds and the risk to children around schools and school buses.

## CONCLUSION

In conclusion, the results from the study suggest the new school bus signs are more effective than the existing signs in raising motorists' awareness to the presence of school buses and, in turn, the possible presence of pupils.

While research suggests that the use of flashing lights may be worthy of further consideration, in the current financial climate the school bus signs trialled in Aberdeenshire represent an affordable, effective solution to increasing awareness to school buses and, in October 2010, Aberdeenshire Council's Transportation & Infrastructure Committee approved the roll-out of the new signage across the region; a process which is currently ongoing.

Nationally (Scottish Government 2009) there is significant interest in the Aberdeenshire school bus sign trial and it is considered there could be the potential for the findings and recommendations from this research to inform future debates concerning school bus signs and potentially the nationwide roll-out of new, improved school bus signage.

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