Your Brain on Booze: Impact of a Multimedia Adolescent Alcohol Educational Resource

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Abstract

This research examines effectiveness of science communication in conveying harm reduction messages about alcohol to adolescents. The average age for initial experimentation with alcohol in New Zealand is 14.6 years – a vulnerable developmental age for the brain. Studies suggest that education should be initiated before drinking patterns have developed and should use interactive resources to have maximum chance of reducing harmful levels of alcohol consumption.

The objective was to test whether an interactive alcohol educational resource was more effective (as measured by participant understanding, preference and information retention) in comparison to a more traditional teaching resource. Two web-based resources aimed at year 10 students were developed that provide the same information. One resource provides information using plain text and images, mimicking many current educational resources. The other resource involves multimedia elements such as story, film, photography, diagrams, narration, animations and music.

Education about the effects of alcohol on the brain (delivered either in the multimedia, or the textbook format) resulted in a significant increase in knowledge, even three-six weeks after resource exposure (p<0.001, all medium-large effect sizes). When comparing resources, those who received the multimedia resource scored significantly higher in the knowledge test immediately after exposure (p<0.05, effect size = 0.09, small effect size). The student body as a whole preferred the multimedia resource with videos and stories, rather than plain text and diagrams alone (qualitative analysis).

When comparing analysis of socio-economic groups by decile ratings of schools the highest rated decile schools performed significantly better with the multimedia resource and maintained significant retention of information in comparison to those who received the traditional styled resource. Lower-rated decile schools performed significantly best with the traditional textbook styled resource. Results found that lower-rated decile classes who received the traditional resource have the best recall of information compared to all other decile ratings. Of those who received the traditional styled resource there was no difference in knowledge between the lowest and the highest-rated decile groups three-six weeks later. Results suggest that socio-economic decile ratings may provide indication of the style and cognitive load of resources that will promote the most effective meaningful learning.
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1. Introduction

This thesis addresses the challenging problem of adolescent alcohol consumption in New Zealand. The first chapter provides a review of the literature to outline the context. The original work described in this thesis involved production of creative components (educational resources) and evaluation of impact of those resources.

1.1 Overview of Drinking Behaviour

Excessive alcohol consumption is of great international concern. Worldwide, 5.9% of all deaths are a result of the harmful use of alcohol, and 25% of the deaths aged between 20-39 years are in some way attributed to alcohol use (World Health Organization, 2014). In 2010, the World Health Assembly endorsed a global strategy to reduce the harmful use of alcohol (World Health Organization, 2014).

Harm from alcohol ranges from: illness, disease, mental health problems, injury (chronic or acute), to death. Other repercussions of alcohol use can include interpersonal violence, family and relationship breakdown, as well as costs to health services, property damage, low productivity, unwanted sexual advances, learning disabilities and work absenteeism (Ministry of Health, 2013a).

New Zealand’s drinking patterns are far from picture perfect; the population is well known for its excessive drinking behaviour. This drinking culture is normalised by an environment supported by the custom of the “6 O’clock swill” and generations of sporting cultures associated with alcohol consumption through sponsoring, marketing and backyard barbeques (Conover & Scrimgeour, 2013). This culture embedded within New Zealand society has left the country with more than a Sunday hangover.

In New Zealand a discussion document for the New National Drug Policy states that up to 70% of injuries in the emergency departments during the weekend are related to alcohol, and that 22% of all claims made to Accident Compensation Corporation (ACC) are associated with alcohol use. In addition, over half of all crimes committed, and one-
third of all family violence assaults in New Zealand are committed by people under the influence of drugs, alcohol or both (Ministry of Health, 2013b).

A New Zealand Survey from the Ministry of Health used a 10-question Alcohol Use Disorders Identification Test (AUDIT), developed by the World Health Organisation (Babor et al., 2001). AUDIT is comprised of questions about an individual’s alcohol use, including volume, frequency, alcohol-related problems and abnormal drinking behaviour. The survey analysed hazardous drinking in New Zealanders, where hazardous drinking refers to a drinking behaviour that involves the risk of harm to the drinker (socially, physically, or mentally), or harmful effects on others associated with the drinker (Ministry of Health, 2013a). These data revealed that 80% of New Zealanders had consumed alcohol in the last 12 months. One in five of these users reported hazardous drinking patterns; this is around 15% of the total New Zealand adult population, roughly 532,000 people. Nearly 15% of these drinkers aged between 12-65 years had exceeded the recommended limits on a weekly basis (Ministry of Health, 2013a).

In New Zealand, socio-economic, gender and geographical factors affect an individual’s chances of developing alcohol abuse, or dependency behaviour. Adults living in lower socio-economic and more deprived areas are more likely to develop hazardous drinking patterns (Ministry of Health, 2007). Furthermore, although Māori and Pacific cultures are less likely to drink alcohol than other cultures in New Zealand, of those who do drink, Māori and Pacific Islanders are respectively 1.5 times and 1.8 times more likely to develop a hazardous drinking pattern (Ministry of Health, 2007). The National Drug Policy acknowledges the necessary development of New Zealand-specific strategies that are culturally appropriate to the needs of Māori and Pacific Islanders, as these groups are identified as high-risk groups for alcohol related harm (Ministry of Health, 2007). It is therefore an important objective to accommodate the particular approaches needed to reduce alcohol harm in these identified populations.
1.2 Adolescents

1.2.1 The Adolescent Brain

Brain adolescence varies between individuals and sex, but can range anywhere between 10 to 25 years of age (Lenroot & Giedd, 2006). By the age of adolescence, individuals have matured beyond childhood, but have not yet reached adulthood. In comparison to children, adolescents are stronger, fitter, and more resilient, withstanding a higher physical stress on the body. Therefore, adolescence can be acknowledged as a developmental period of optimum physical representation (Dahl, 2004). Yet, during this period mortality rates increase by 200% as a result of lack of emotional and behavioural control (Dahl, 2004). This is because adolescents with developing brains exhibit behaviour associated with increased risk-taking, sensation-seeking, and reckless behaviour (Bava & Tapert, 2010).

Adolescence is a unique period of development that involves cognitive, emotional and social maturation of the brain. Some studies have shown increased activity in the prefrontal regions indicating maturation, and decreased activity in other brain regions, allowing for cerebral function reorganisation (Brown et al., 2005; Rubia et al., 2006). As a result, the brain undergoes various plastic and dynamic processes, enabling refinement and specialisation of functions for the remainder of life (Guerri & Pascual, 2010).

1.2.2 Adolescent Drinking Behaviour

The Ministry of Health has identified the youth of New Zealand as a group at high-risk of alcohol harm. A binge drinking session, or “risky drinking” in young people aged 18-24 years is defined as five or more standard drinks in any one drinking session, as stated by the Health Promotion Agency (HPA). The Ministry of Health surveys show that, although the 18-24 year age bracket does not consume as much alcohol as the 55-65 age bracket, they are more likely to consume large amounts of alcohol in any one typical drinking session (Ministry of Health, 2007).
It is not just young people over 18 that are at risk in New Zealand: as many as 61% of New Zealand secondary school students are classified as regular drinkers (Adolescent Health Research Group, 2008) and the Youth 2000 series found that in 2012 eight percent of students under the age of 16 years were classified as binge drinkers (Fleming et al., 2014). As a result victims can be left with emotional and relationship problems that affect the overall wellbeing of the adolescent, as well as poor educational achievement, employability, learning and behavioural difficulties (Adolescent Health Research Group, 2008).

Looking deeper New Zealand youth reveals that the average age for the first drink is 14.6 years (Kypri, 2009). A survey of New Zealand Year 10 students, aged between 14-15 revealed that 40% had consumed alcohol in the last month and that 17% of these youth drinkers said they had engaged in risky drinking behaviour within the last month (Health Promotion Agency, 2013). Those who had engaged in risky drinking were also more likely to have consumed alcohol weekly, and without their parents'/caregivers' knowledge. Within this survey of Year 10 students, Māori were more likely to have experienced risky drinking and consumed alcohol in the last month than any other ethnicities involved in the study (Health Promotion Agency, 2013).

Although people aged 18-24 years have the highest rates of hazardous drinking, this has dropped from 49% in the 2006/2007 surveys, to 36% in the current survey (Ministry of Health, 2013a, 2013b). The largest drop in alcohol consumption was in youth aged 15-17 years, where the proportion fell from 75% in 2006/2007, to 59% in 2011/2012 reports (Ministry of Health, 2013a). The Youth 2000 survey series by the Adolescent Health Research Group have shown this decline in secondary school binge drinking from 2001-2012 (Figure 1.1). Despite a trend in the reduction of harmful drinking behaviour in adolescence, the acknowledgment of the high prevalence of binge drinking and alcohol-related harm in New Zealand’s adolescents indicates that essential development of strategic interventions is required to address this national issue.
Figure 1.1: A bar graph representing the decline in binge drinking by secondary school students. Data recorded from 2001, 2007 and 2012 sourced from the Youth 2000 survey series: Youth 12’ Overview (Clark., 2013).

The World Health Organisation published the Ottawa Charter in 1986, which was a signed international agreement following discussions at the First International Conference on Health Promotion (World Health Organisation, 1986). The document was broken down into five areas of focus:

1. Building healthy public policy
2. Creating supportive environments
3. Strengthening community action
4. Developing personal skills
5. Re-orienting health care services toward prevention of illness and promotion of health

This was a central document to health promotion, however provided no clear theoretical framework supporting the principles held within the Ottawa Charter; which has resulted in some problems and inconsistencies within health promotion (Eriksson & Lindstrom, 2008).
Although the Ottawa Charter has helped to guide the development of the public health promotion in the last 25 years, the world has changed since then. Specifically, the binge drinking culture in New Zealand has changed as youth start drinking younger, partly in response to the legal age of purchasing alcohol in New Zealand changing from 21 years to 18 years of age (Conover & Scrimgeour, 2013). Therefore our tactics to approach and educate around these issues must also change with the times.

1.2.3 The Adolescent Brain and Alcohol

Many of the long-term consequences of early alcohol consumption are not completely understood (Maldonado-Devincci, Badanich, & Kirste, 2010). Yet, there is convincing evidence that the brain is vulnerable to the harmful effects of alcohol at this developmental stage (Guerri & Pascual, 2010; Medina et al., 2008; Roaten & Roaten, 2012).

Results from Squeglia and colleagues (2009) suggest that youth who participated in heavy drinking behaviour for a period longer than one or two years had small changes in neural organisation, ultimately showing greater abnormalities and differences in neurocognition. Some of these abnormalities include: brain structure and white matter volume when comparing 15-17 year olds with and without alcohol use disorders (Medina et al., 2008); and brain activation in cognitive tasks (Squeglia, Jacobus, & Tapert, 2009). In addition to anatomical and functional changes in broad areas of the brain, Nixon and McClain (2010) reported that alcohol interacts with the reward neurocircuitry of the adolescent brain, in turn encouraging maladaptive behaviours. Thus, the adolescent brain, because of its vulnerability to alcohol-induced harm, is a critical window for developing substance abuse and addiction (Nixon & McClain, 2010).

Overall, alcohol abuse during adolescence may disrupt brain plasticity and maturation processes, resulting in short and long-term behavioural and cognitive deficits (Bava & Tapert, 2010; DeWit et al., 2000; Guerri & Pascual, 2010; Maldonado-Devincci et al., 2010; Tapert, Caldwell, & Burke, 2004).
1.3 At risk adolescents

1.3.1 Invincibility and the "personal fable"

Egocentric feelings can lead adolescents to think that they are indestructible to the potential outcomes of dangerous and risky behavior (Wickman, Anderson & Greenberg, 2008). Elkind (1967) described the concept of invincibility as a natural stage for egocentric thinking in adolescents undergoing development (social and cognitive) in their search for identity, and termed this concept the personal fable (Elkind, 1967). Researchers are trying to learn more about teenagers’ feelings of invincibility and their perceptions of risk in an attempt to understand how to best work with teenagers who feel invincible and consequently engage in risky or dangerous behaviour (Wickman, Anderson & Greenberg, 2008).

In interviews regarding risk, danger and invincibility, teenagers reported seeing themselves as “shielded” or “protected” from danger or injury. One participant said, ”Somehow I think that it can never happen to me because it is (only) other people who have bad things happen”. Teenagers believe the odds of a negative outcome are so small that the reward outweighs the risk. For example, teenagers admitted that they knew that alcohol, drug use, or sex would make them feel good..."that feel-good thing”, therefore the thrill was identified as being the reward for participating in risky behaviour (Wickman, Anderson & Greenberg, 2008).

Teenagers stated that they often felt misunderstood and upset with the negative images and stereotypes of teenagers portrayed by the media, as well as their parents reinforcing this stereotype as a "difficult" time. Because of this negative stereotype, some teens felt they did not have the opportunity to prove themselves otherwise (Wickman, Anderson & Greenberg, 2008).
1.3.2 Analysing risk-taking propensity

When adolescents are undergoing transitions beyond their coping capabilities, risky and dangerous behaviour, including substance use, may be substituted for coping mechanisms (Damphousse & Kaplan, 1998).

In 1995, Cohn and colleagues found that perception of risks of participating in health-threatening activities was lower for teenagers in comparison to their parents. These results suggest that adolescents underestimate risks associated with health-threatening activities, such as occasional intoxication, reckless driving and drug use. In this study the results suggest a failure to perceive the magnitude of the risk. This study also found that parents perceive risky activities to be more harmful for their teenagers than for themselves, which could “magnify the apparent recklessness of adolescent behaviour” (Cohn et al., 1995).

Teenagers may also perceive the risk of harm as cumulative, rather than independent across situations (Cohn et al., 1995) and literature supports that if teenagers think that risk is cumulative rather than an immediate independent effect, they will take more risks (Diamond, 1990). Cohn and colleagues (1995) suggest that when adolescents perceive a greater risk in one particular dangerous situation, this will reduce the chance that they will partake in that particular activity and consequently reduce harm, injury and death associated with that risk.

It has been consistently shown in the literature that males have a greater tendency for risk-taking behaviour than females (Byrnes, Miller, & Schafer, 1999). A possible evolutionary explanation for greater risk-taking behaviours in males is that males compete for mating opportunities and those willing to take higher risks will have greater reproductive advantages (Baker & Maner, 2009).

Causing trouble within the family and with loved ones was also identified as undesirable outcomes of risky or dangerous behaviour (Wickman, Anderson & Greenberg, 2008). When defining the difference between risky and dangerous, teens stated that "Risky
sounds like something that is just not smart to do and dangerous like something that definitely would hurt you" (Wickman et al., 2008 p. 464, participant quote). If a behavior was labelled as risky it was perceived by teenagers as having unknown outcomes, whereas dangerous was perceived as a certain chance of harm or injury. Those involved with dangerous behaviour were seen as wanting to hurt themselves (Wickman, Anderson & Greenberg, 2008).

Many factors that appeared to be protective against participation in risky behaviour were identified in the Wickman (2008) study. If teenagers had personal goals to work towards, their focus shifted from today to the future and these teenagers were less likely to participate in risky behaviour. Teens stated that if the risky behaviour compromised the opportunity that they were working towards (personal goals as a career for example) then the risk was not worth it (Wickman, Anderson & Greenberg, 2008).

Avoidance behaviour is where a teenager will dissociate themselves from peers or risky/dangerous situations. For example, teenagers said that they would avoid a party if they knew that alcohol was going to be served. These avoidance, or other isolating behaviours are known as protective coping mechanisms (Wickman, Anderson & Greenberg, 2008). Another protective mechanism that teenagers use is to watch their friends try something first and see how much trouble they get into (Wickman, Anderson & Greenberg, 2008). Individuals often choose friends, and are chosen as friends, if they share similar goals, values and behaviours (Kandel, 1990).

1.3.3 Reducing risk-taking propensity

The frame of mind that "bad things will only happen to other people" needs to be addressed to start approaching the idea of invincibility. To achieve this it is important to spend time with adolescents, share personal stories and make experiences real by showing teens how risk behaviours and their consequences can affect them (Wickman, Anderson & Greenberg, 2008). Creating resources and programs that focus on risk behaviours can potentially empower teens by acknowledging their strengths and identifying protective factors in their environment (Anderson & Kagawa-Singer,
The Wickman study (2008) accentuates the importance of including teens in the development of effective strategies and using teens’ insights to develop interventions:

*Health education programs are best facilitated by other teenagers or young adults who have been through a similar experience themselves. Through sharing personal experiences, peers can make their stories come alive and help teens realize that “yes, this could happen to me”.*

- Wickman, Anderson & Greenberg, 2008. P. 466

Showing "vivid" examples of risky and dangerous behaviour will enhance attention, prolong focus and increase emotional long-term memory storage, known as "Zillmann's exemplification theory" of concrete examples (Zillmann, 2002). Adolescents consider the “vivid” picture of the potential risk outcome to be more effective and valuable than just pointing out or lecturing health statistics (Wickman, Anderson & Greenberg, 2008). Nisbett & Ross (1980, p.45) describe vividness as "emotionally interesting, concrete and imagery provoking, proximate in a sensory, temporal, or spatial way".

The effectiveness of shock tactics for public health campaigns is somewhat unclear. There are differing views throughout literature (Lewis et al., 2007; Sutton, 1992; Witte & Allen, 2000) and this could also depend on the content, the type of health campaign and the particular shock tactic used. Witte and Allen (2000) suggest that “strong fear appeals and high-efficacy messages produce the greatest behavior change, whereas strong fear appeals with low-efficacy messages produce the greatest levels of defensive responses” (Witte & Allen, 2000, p. 591). Sutton (1992) which provided a review of several earlier shock tactics used in health promotion campaigns showed that providing viewers with a reassuring message (that if adopted would result in avoiding that unwanted event) would encourage intentions of behavioural changes to obey that message (Sutton, 1992). Sutton's findings on fear-arousing communications are that “we should not be frightened of using fear appeals in our efforts to induce change in health-related attitudes and behaviours” (Sutton, 1992, p. 519).
In order to test effectiveness of programmes to address adolescent invincibility or perceived risk, and to minimise participation in risky behaviours, we must have a reliable and valuable tool to measure the perception of invincibility in the teen population. Such measurement tools would provide health care and education workers with the means to provide anticipatory counselling for adolescents at risk (Wickman & Koniak-Griffin, 2013).

The Evaluation of Risks scale was developed as a self-reporting inventory to assess risk-taking propensity (Sicard, 2001). This visual analog scale designed to rate risk proneness was composed of 24 items within five factors; self control, danger seeking, energy, impulsiveness, and invincibility (Sicard, 2001). Using the Evaluation of Risks scale, Killgore and colleagues (2010) were able to validate that men score significantly higher in four out of the nine indicators of risk-taking propensities (Killgore et al., 2010).

Wickman and Koniak-Griffin (2013) created another invincibility measurement tool in 2013. This Adolescent Invincibility Tool (AIT), a psychometrically sound tool "for identifying teenagers who exhibit invincibility and a propensity towards invincible thinking in risky situations" (Wickman & Koniak-Griffin, 2013, p. 583). The tool includes a 25-item statement list where participants aged between 14-20 years are asked to rank each question on a scale from strongly agree to strongly disagree. The AIT was found to be a valid and reliable tool for screening for feelings of invincibility in adolescents, although further testing of adolescents with greater sample sizes and diverse populations is required (Wickman & Koniak-Griffin, 2013).

Looking to New Zealand, the Substances and Choice Scale (SACS) is a screening instrument for identifying risk behaviours and was created by Christie and colleagues in 2013. The youth who undergo this brief SACS screening intervention have the opportunity to reflect on and consider their risk-taking behaviour, as well as potential outcomes from that risk-taking behaviour. Future goals are set, with an aim to minimise engagement in future risk-taking behaviour. Clinician guides and training for health professionals to use the SACS interventions are in progress around New Zealand (Christie et al., 2013). Consequently this scale is only accessible to youth who
come in contact with clinicians and health and youth workers that are sufficiently trained in the SACS interventions.

While the tools outlined in this section may be useful in understanding the decisions and intentions of adolescents in theory, in practice they have limited power given that many alcohol-related decisions are made when adolescents are not sober (Schulenberg & Maggs 2002). And based on the literature it is difficult to tell which comes first, decreased perceived risk or feelings of invincibility. Do adolescents perceive a much lower risk than adults, based on a false representation or inability to calculate risk? Or do adolescents understand the risks involved but adhere to the “personal fable” of Elkind (1967) and take part in risky behaviours believing that a bad outcome will never happen to them? Teenagers need a better understanding of the fine balance of risk-taking, whilst still being safe, and resources to allow them to discern the difference between what is risky and what is dangerous, in order to establish new strategies for minimising risky and dangerous behaviour.

1.4 Alcohol harm reduction education in secondary schools

1.4.1 Current national alcohol education teaching requirements

New Zealand’s alcohol education programmes are limited in comparison to the rest of the world, despite a massive adolescent binge-drinking problem. Analysis of the New Zealand Qualifications Authority (NZQA) Health curriculum level 1-3 (aimed at 15-18 year olds) reveals that only two standards can accommodate adolescent alcohol education: “Demonstrate understanding of issues to make health-enhancing decisions in drug-related situations”, and “Analyse an adolescent health issue”, which may not necessarily be alcohol related (New Zealand Qualification Authority, 2014). Although it must be noted that any topic explored in health education could comment on the alcohol experience. Yet, a goal of the National Drug Policy is that the Health and Physical Education in New Zealand Curriculum “requires schools to provide students with opportunities to learn and to make informed, health-enhancing decisions about drugs.” This acknowledges the lack of opportunity for alcohol education within the school curriculum. As a result, individual schools or teachers who want to provide alcohol
education have to source external material to compensate, resulting in an unstandardized approach and potential mismatch of information and sources.

A number of resources have been developed, including the Drug Abuse Resistance Education (DARE) programmes, originally used in Los Angeles, USA. However, DARE has been found to be non-efficacious nationally as well as internationally, resulting in cessation of the programme in some areas of New Zealand (Ennett et al., 1994; Lloyd, 2000). The Foundation for Alcohol and Drug Education (FADE) provides many resources for adolescents regarding alcohol abuse, but none that are specific to New Zealand’s cultural needs (Foundation for Alcohol and Drug Education, 2014).

The Health Promotion Agency aims to change the binge drinking culture of New Zealand, encouraging people to take greater responsibility with their drinking (Ministry of Health, 2007). The organisation develops resources available for purchase, updated as recently as September 2014 (Health Promotion Agency, 2014).

In 2006, the Centre for Social and Health Outcomes Research and Evaluation at Massey University produced a review of New Zealand’s school-based alcohol intervention initiatives. This review concluded that although schools provide a captive audience, New Zealand needs to move beyond the classroom (Massey University, 2006). The review also recognised that New Zealand needs sufficient infrastructure support for the initiation of cross-sector programmes, as schools do not have the resources to tackle such a problem (Massey University, 2006). Studies of effectiveness of these external resources in New Zealand are non-existent. Therefore, discussion of the resources available in New Zealand is based on information in the ‘grey’ literature obtained through government and departmental websites.

1.4.2 Alcohol Harm Reduction

Alcohol programmes that target adolescents by advocating abstinence only and delayed-use have limited success, as youth may have already developed unhealthy drinking patterns by the time they use these programmes, (McBride et al., 2004). These
abstinence-based programmes provide youth with limited advice about how to cope with alcohol abuse (Yoshimoto et al., 1992). Some of the “just say no” programmes are believed to be counterproductive, as adolescents have a tendency to rebel and therefore may respond to the message as though it is an invitation to participate in the ‘forbidden behaviour’ (Marlatt, 2002).

A successful approach should acknowledge that the majority of youth will drink. Thus, education should enable the user to better handle their drinking and reduce the risk of harm (Midford & McBride, 2004). Harm reduction is used in public health approaches to reduce alcohol-related problems through the control of production, marketing and consumption of alcohol, without calling for abstinence (Marlatt, 2002; McBride et al., 2004). The harm reduction approach directs dangerous drinkers to make behavioural changes, and includes individuals who do not have severe alcohol dependence issues (Marlatt, 2002).

Youth attitudes towards harm reduction programmes have been more positive than those towards alternative abstinence-based programmes (Marlatt, 2002; McBride et al., 2004; Skewes, 2013). In 2004, the SHAHRP (The School Health and Alcohol Harm Reduction Project) in Western Australia conducted a study over a 32-month period with a clear harm minimization goal (McBride et al., 2004). The study found that the 2300 students (aged 13-15 years at the initiation of the study) who participated in the intervention programmes might consume alcohol, but were less likely to drink in a dangerous and damaging fashion (McBride et al., 2004). Students that received the interventions reported a 33%, 17% and 23% reduction in harm associated with their alcohol from three follow-up sessions, respectively, over a two-year period (McBride et al., 2004). This study, among others, supports the use of classroom-based intervention education and the implementation of harm reduction goals, rather than abstinence or delayed approaches (Evans-Whipp, 2013; Marlatt, 2002; McBride et al., 2004; Midford & McBride, 2004; Skewes, 2013; Vogl, 2009).

Harm reduction offers three advantages over other abstinence-based programmes. Firstly, harm reduction applications minimise the harmful consequences of alcohol abuse. Secondly, harm reduction provides an alternative to abstinence-based
programmes, aiming to meet the needs of the individual. And finally harm reduction advocates alternative low-threshold services (for example, including setting moderation or abstinence drinking goals that are particular to the needs of the individual compared to traditional alcohol prevention and treatment (Marlatt, 2002).

New Zealand has recently reconsidered its goals in the second National Drug Policy (2007-2012), to predominantly focus on a reduction in harm and frequency to individuals, families and communities (Ministry of Health, 2007; National Research Bureau, 2012). This policy promotes three ideas: supply control, demand reduction and problem limitation. Supply control aims to restrict the availability of drugs. Demand reduction aims to prevent or delay the use of drugs, encouraging drug-free lifestyles, and creating awareness of the risks involved. Problem limitation aims to reduce the harm from existing drug use.

1.4.3 Comprehensive approaches

A study from the Centre for Social and Health Outcomes Research and Evaluation (SHORE) at Massey University partially adopted the terminology “harm reduction” in their approach to discover the ‘best practice’ principles for the delivery of effective alcohol and drug education to young New Zealanders (Massey University, 2006). Although this may be a step in the right direction, literature has repeatedly suggested that school involvement alone is insufficient for behavioural change (Lloyd, 2000; McBride et al., 2004; Midford & McBride, 2004). Massey University therefore recommended that the “whole school” approach be combined with wider community action, as well as parental involvement (Massey University, 2006). As adolescents’ social environment plays an essential role in the establishment of behavioural patterns, the suggestion above is supported by many programmes, which include the community (Midford & McBride, 2004). The literature also identifies the importance of the parents’ role in their children’s drinking behaviour, as the frequency of drinking in adolescents is strongly associated with their parents’ drinking habits (Casswell et al., 1991; Midford & McBride, 2004). As a result of evaluating past interventions and programmes over decades, Stigler and colleagues (2011) developed a theory-driven “ideal” set of criteria
for an approach that better promotes long-term behaviour change. As a result, to be effective interventions must:

- Be theory-driven,
- Address social norms of alcohol prevalence and use,
- Build on personal and social skills,
- Use interactive teaching techniques and resources in the classroom,
- Use same-age peer leaders,
- Be implemented in multiple domains (school, parents, community, media, policy),
- Deliver and evaluate across multiple years and
- Use culturally and developmentally appropriate delivery.

Educational programmes must implement four stages as discussed in Rogers’ diffusion model. These four stages include: dissemination (effective innovations are distributed), adoption (organisations decide to use the programme), implementation (correct and intended delivery of the programme), and maintenance (institutionalisation over time) (Rogers, 1995; 2002).

Comprehensive approaches have a number of limitations. The suggestions below highlight the important point that the full potential of preventative interventions have yet to be seen (Spoth, Greenberg, & Turrisi, 2009). First, internationally there has been a particular focus on the limitations of harm reduction approaches. Harm reduction in some cases has been perceived to be an effort to legalise underage drinking (Dupont, 1996). Some believe that harm reduction may encourage future harmful behaviour, as it discourages full abstinence (Erickson, 1995).

Secondly, there is as yet limited evidence that a comprehensive approach is more successful than individual domain interventions. This means that schools and communities are hesitant to advocate multi-domain programmes (Spoth, Greenberg, & Turrisi, 2008). Resources, in terms of funding, trained staff, and materials are difficult to maintain. There needs to be infrastructural support for both the facilitators and domains involved (Stigler et al., 2011).
Spoth, Greenberg, & Turrisi (2008) provide evidence that parental involvement in interventions increases success; yet encouraging support from parents is another limiting factor. Many parents may be reluctant to change their own drinking behaviour, let alone enforce a change in the family’s behaviour. Students will therefore find it difficult to change their own behaviour if they live in an environment that condones and engages in binge drinking (Chalder, Elgar, & Bennet, 2006).

Further work needs to address specific types of interventions or specific populations. Spoth, Greenberg, & Turrisi (2009) recommend that evidence of longitudinal studies, replication studies and reporting of evidence needs to be standardised.

The benefits of a community role should be evaluated in the context of the surrounding resources (Midford & McBride, 2004). More community-based interventions need to be analysed to help evaluate the components of community structures that either aid or inhibit the success of interventional programmes (Spoth, Greenberg, & Turrisi, 2008). Further roles of the media need to be analysed and guidelines established to promote harm reduction, as the community has been shown to be an integral part in controlling the amount and types of media and advertising tolerated (Anderson et al., 2009; Connor et al., 2010; Stewart & Casswell, 1993).

When targeting the cultural aspect of a population it is important to differentiate surface changes from structural changes: that is either surface changes to pictures, wording, or stories, or deeper structural changes to the skills, attitudes or policies that differ between cultures (Spoth, Greenberg, & Turrisi, 2008).

One suggested model is to use a combination of intervention programmes that focus on different domains of a comprehensive approach (school, community, families, peer support, education and training). On the other hand, deconstructing particular domains of a comprehensive approach may help evaluate the efficiency of combining such domains and either support, or reject the hypothesis that single domain, family-orientated interventions work best (Spoth, Greenberg, & Turrisi, 2008).
1.4.4 Analysis of youth alcohol education

Studies have found that intervention programmes that target youth before they have started drinking are more successful at decreasing the level of alcohol use and continued delay of alcohol consumption (Lloyd, 2000; Perry et al., 1996). A New Zealand study found that hazardous binge drinking found in University students begins in high school (Kypri, 2009). Schools are therefore the ideal place to communicate harm reduction messages, as they provide a captive audience, a place of learning, and the target audience is most effectively influenced at this stage of their development (Midford & McBride, 2004). No other community organisation has such a continuous and widespread contact with youth (Stigler et al., 2011).

Formal school-based alcohol education dates back to the 1880s, and by 1901 every American state and territory had mandatory alcohol and drug education (Midford & McBride, 2004). In the 1960s, scare and information-only strategies were the primary focus. However, maximising fear in students ultimately resulted in little impact in harm reduction (McBride et al., 2004). Much past alcohol education has failed to result in behavioural change. This is most likely due to poor communication and the focus on abstinence (Paglia & Room, 1999).

After the prohibition of alcohol period in the USA in the 1930s, the abstinence-orientated tactic to alcohol education was replaced with a “harm reduction” policy (Midford & McBride, 2004). This led to the development of programmes that focused on enhancing personal self-esteem, decision-making, stress management and goal setting. This has resulted in an improved strategy for alcohol harm reduction that has produced some successful results (Midford & McBride, 2004).
S. Campbell


<table>
<thead>
<tr>
<th>Children younger than 10 years of age</th>
<th>Key Informational Source</th>
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<tr>
<td>Linking the Interests of Families and Teachers</td>
<td>Eddy et al., 2000; 2003</td>
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<tr>
<td>Raising Healthy Children</td>
<td>Catalano et al., 2003; Brown et al., 2005</td>
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<td>Seattle Social Development Project</td>
<td>Hawkins et al., 1991;1992</td>
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<tr>
<th>Adolescents aged 10 to 15 years</th>
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<tr>
<td>keepin’ it REAL</td>
<td>Hecht et al., 2003</td>
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<tr>
<td>Midwestern Prevention Project/Project STAR</td>
<td>Pentz et al., 1989; 1990;1995;1998</td>
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<td>Project Northland</td>
<td>Perry et al., 1996; Klepp et al., 1995; Perry et al., 2002</td>
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<th>Older participants aged 18 to more than 20 years</th>
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<tr>
<td>Project Toward No Drug Abuse</td>
<td>Sussman et al., 2002</td>
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Spoth, Greenberg and Turrisi (2008, 2009), leading researchers in this area, examined 400 studies in the USA for their efficacy and evidence of effects, in the last 15 years. To determine how promising the evidence for the effectiveness of a given intervention was, six criteria were established; experimental design, sample specification, outcome assessment, effects observed, additional quality-of-evidence criteria, manualization (Spoth, Greenberg & Turrisi, 2008; 2009). Their reviews found that only 127 alcohol education interventions could be evaluated, according to the criteria used (including type of intervention, the target population age and the outcome of interest), and only 41 interventions showed evidence of effectiveness. Within the effective groups of interventions, there were three interventions that met the criteria of “most promising evidence” targeted at the 10-15 years age group (See Table 1.1) (Spoth, Greenberg & Turrisi, 2008; 2009). There was just one school-based intervention programme that met the criteria of “most promising evidence”, targeted at the age group of 16 years and older (See Table 1.1) (Spoth et al., 2008, 2009; Stigler et al., 2011).
Three harm reduction interventions that have been exhaustively evaluated but are not mentioned in the previous table are: The Life Skills Training programme (LST), the Alcohol Misuse Prevention Study (AMPS), both in the United States of America, and the SHAHRP study in Australia, as mentioned previously. According to other studies, these programmes have been shown to be successful in reducing the initiation of alcohol consumption, or reducing the occurrence of harmful drinking in adolescents. Evaluations of interventions also identify that at least three years of interventional education is necessary to establish and maintain a behavioural change in adolescents (Marlatt, 2002; Perry et al., 2002; 1996; Stigler et al., 2011).

Of these three interventions, Life Skills Training (LST) is one of the most thoroughly evaluated middle school education programmes. While Spoth, Greenberg and Turrisi, (2008, 2009) placed the LST programme within the “mixed or emerging evidence” of effectiveness, a two-decade analysis has suggested that participants who received LST were half as likely to partake in binge drinking after one and two year follow-ups than those who did not receive the training (Botvin & Griffin, 2004). The LST programme focuses on self-management skills, general social skills, and the educational aspect of information specific to alcohol and other drugs. The intervention provides teachers and students with resources for the first year of classes, along with two years of booster classes to reinforce ideas. The LST programme uses a conventional method of teaching (Botvin & Griffin, 2004).

One of the most internationally successful interventions is the “Project Northland” study in northeastern Minnesota, which was ranked in the top three effective interventions in the reviews by Spoth et al. (2008, 2009), for ages 10-15 years (See Table 1.1). The study included 24 school districts using a combination of school curriculum, parent involvement and education, peer leadership, print media, youth development and community task forces, all involving aspects of training and education. This combined approach was implemented over a 7-year period. Project Northland showed that at least three years of intensive intervention involving the community, parents and the school were necessary to produce lasting effects and changes in behaviour as a reduction of alcohol abuse in youth (Perry et al., 2002;1996). The strongest effects in this study were evident in those who received education before initiation of alcohol use (Perry et al.,
There was also an Interim Phase, lasting two years in the midst of the study where communication was of a minimum intervention. This revealed a negative impact on the students in relation to an increase in alcohol consumption, frequency and abuse, exemplifying the need for constant communication throughout the adolescent years (Perry et al., 2002). The results show that a behavioural change can occur through sustained multi-level intervention, but that age-appropriate intervention mechanisms are crucial throughout the entire process (Perry et al., 2002). Perry and colleagues suggest that successful results are due to a comprehensive project introduced throughout the transition from intermediate school to high school, and sustained throughout adolescence.

Of the three intervention programmes that Spoth, Greenberg and Turrisi, (2008, 2009) identified as “most promising evidence”, two interventions were multi-component, -domain programmes involving the combination of the following: the school, wider communities, parents, environmental, policy and multiethnic domains of focus. The one programme that was not considered a multi-domain structure, yet scored the top intervention for ages 10-15 years, by Spoth, Greenberg and Turrisi, (2008, 2009) was the “Keepin’ it REAL” programme (See Table 1.1). However, this intervention was targeted at multiethnic and urban populations and may not be suitable for other populations or cultures.

Culture is an important aspect to consider when communicating ideas in New Zealand, as the diversity of a multicultural population can result in a struggle with an adolescent’s own identity formation (Elliott & Lambourn, 1999). Adolescent culture is one of the foundational reasons for using a peer-led method approach in Elliot and Lambourn’s methods (1999) to combat the contemporary norm of New Zealand binge drinking culture. The literature reinforces that the cultural dimension of an interventional programme is an integral and essential factor in its success (Amodeo & Jones, 1998; Delauney, 2013). From these reviews it seems crucial to include a multi-domain or -cultural approach, to achieve a successful comprehensive intervention programme (Spoth, Greenberg & Turrisi, 2008; 2009; Stigler et al., 2011). As well as this, the impact
of preventative programmes may be maximised by intervening in multiple domains (Spoth, Greenberg & Turrisi, 2008).

The New Zealand Ministry of Health agrees that health-based promotion initiatives are best supported with consistent family- and community-based approaches (Ministry of Health, 2007). The Ministry acknowledges that personal decision-making and other life skills need to be a focus of health campaigns about the use of alcohol (Ministry of Health, 2007). As a result, 15 Community Action on Youth and Drugs (CAYAD) programmes have been initiated in New Zealand, identifying the best alcohol education for young people, communities, and families (Ministry of Health, 2007).

One New Zealand intervention has a review available regarding the prevention of substance use problems among youth (Paglia & Room, 1999). However, as detailed as the review is, it was published 15 years ago, and therefore does not cover more recent studies and findings on harm reduction and comprehensive approaches discussed here. New Zealand needs to change from earlier methods that focus on personality characteristics of adolescents, to methods that focus on their social worlds of family and peer groups. Furthermore, focus should be broadened to the wider society and encourage new goals for the community (Perry et al., 2002). A future aim would be to initiate a comprehensive programme that includes effective teaching resources into the New Zealand Health Curriculum.

1.5 Effective Teaching Resources

1.5.1 Student learning styles

Students of this generation have the ability to work in a world of extreme digital complexity and make decisions swiftly (Prensky, 2006). “Net Generation” students are estimated to spend 20 hours per week multitasking on a range of digital, mobile, online media environments between school, work and recreational use (Caruso & Salaway, 2007). The classroom needs to recognize students’ abilities and take advantage of their skills for the successful transfer of information (Berk, 2009).
An understanding of how students learn and process information enables consideration of dynamics needed for effective teaching resources. Berk's (2009) review of multimedia teaching acknowledges three core intelligences from several studies throughout literature that are part of the “unique profile” of every student’s intelligence makeup:

1- Verbal/linguistic: Learn by reading, writing, speaking, listening, debating, discussing, and playing word games.
2- Visual/spatial: Learn by seeing, imagining, drawing, sculpting, painting, decorating, designing graphics and architecture, coordinating color, and creating mental pictures.
3- Musical/rhythmic: Learn by singing, humming, listening to music, composing, keeping time, performing, and recognizing rhythm.

Learning style is used to define an individual’s biologically or experientially induced characteristics that have the potential to positively or negatively impact knowledge gain (Dunn, 1984). Understanding learning styles is believed to be advantageous for educators to analyse, motivate and assist students in schools (Keefe, 1979). Variables or elements that are important to a student are called strong preferences. Students are able to predict some of their strong positive and negative preferences for learning, but are sometimes unaware of other preferences, like temperature or the time of day, that may also have an effect on their learning abilities (Farr, 1970). It has been shown that students matching their self-recognised learning preference achieve higher reading, fact knowledge, attitude and efficiency scores than those mismatched with their learning style preferences (Farr, 1970; Pizzo, 1981; Shea, 1983). Student learning preferences have been found to remain consistent despite the subject being taught (Copenhaver, 1979). As well as this, it appears that the learning style of the teachers is also important. Indeed, students’ grade point averages are higher the closer their learning style is to the learning style of their teacher (Cafferty, 1980). Yet there are multiple learning styles in each classroom (Copenhaver, 1979). Nowadays technology enables teachers to use resources that provide characteristics catering to multiple learning styles, and can therefore resonate with students from several learning styles in the one classroom, at the same time.
1.5.2 Impact of multimedia teaching resources

Literature shows that interactive experiences have greater effect in communicating ideas than traditional teaching methods of lecturing and plain text alone (Borko et al., 2008; Moreno & Valdez, 2007; Pryor & Bitter, 2008; Smith, Hardman, & Higgins, 2006; Zhang, 2005). The term multimedia refers to the arrangement of material presented in two or more formats, like auditory, verbal, visual or pictorial (Mayer, Heiser, & Lonn, 2001). Some studies have tested multimedia components using platforms such as PowerPoint (Mayer & Johnson, 2008), games (Moreno & Mayer, 2005) and computer-assisted video learning (Gay, 1986). Berk (2009) also showed that using a combination of auditory, verbal, visual and pictorial media can increase memory, comprehension, understanding, and deepen learning, compared to using each media component individually.

By contrast, however, there are other studies showing that multimedia resources do not achieve higher learning scores (Proctor & Richardson, 1997; Wang, 2010; Williams et al., 2001). Williams and colleagues (2001) conducted a blind trial with medical students comparing a computer-based multimedia package with a traditional lecture and found that there was no difference in knowledge gained between the two formats. Those who received the computer-based multimedia format scored higher for assessment skills (knowledge, mental state examination skills, perception of knowledge and ability), but students did not perceive the computer package to be more useful (Williams et al., 2001).

Although the majority of literature illustrates that multimedia learning is more effective, the type of multimedia components and in what combination, as well as the factual content embedded within the resource need a systematic tool to evaluate which resource will improve learning and which combination will inhibit it or have no effect.

The Learning Object Review Instrument (LORI) is a multimedia evaluation tool available from E-Learning Research and Assessment Network (Leacock & Nesbit, 2007). This tool evaluates the quality of nine aspects of multimedia learning resources: content quality, learning goal alignment, feedback and adaptation, motivation, presentation design,
interaction usability, accessibility, reusability, and standards compliance. Users evaluate, review and rate a multimedia resource using LORI with the goal to have balanced assessment validity. Using such a tool is crucial in growing and sustaining shared knowledge concerning multimedia resources (Leacock & Nesbit, 2007).

1.6 Use of story/narrative

1.6.1 Narrative Vs. Logical Scientific Information

New styles of information communication like blogs and other platforms mix fact with opinion without distinguishing between the two, unlike traditional informative reporting (Brossard & Scheufele, 2013). These new informative platforms (Facebook, Twitter etc.) help to diminish gaps between varied educational backgrounds, but can at the same time compromise the quality of the information (Anderson & Still, 2013). As the population using these new media platforms increases and users are able to customise their preferred information, the use of narratives in science also increases as a response to the conflicting non-scientific information and an attempt to connect with the audience (Dahlstrom, 2014).

Narratives are often presented as entertainment rather than education and rely on characters rather than external sources (Green, 2006). The use of characters in the narrative usually provides a story arc (beginning, middle and end), which helps tie the information together, rather than no natural connection or flow (Green, 2006). The benefits of using narrative for a means of communication is that a narrative can provide increased understanding, interest and focus in comparison to traditional logic-based scientific communication (Bruner, 1986; Green, 2006). More specifically, scientific content that ties in closely with the story arc, or the plot of the narrative requires less effort for comprehension and results in a heightened understanding (Dahlstrom, 2014; Fisch, 2000). Studies have also suggested that the use of narrative results in improved recall, understanding and shorter reading times (Moore & Zabrucky, 1999; Schank, 1995). There is evidence to suggest that narratives are more effective in providing inspiration, explanations, and transfer into long-term memory (Glaser, Garsoffky & Schwan, 2009).
Bruner (1986) has suggested that the two forms of communication (scientific logical information versus narrative) have two separate cognitive pathways of comprehension. The first pathway, called “the paradigmatic pathway” is responsible for the processing of science-based evidence. The second pathway organises “situation-based exemplars”. Depending on the pathway used, there will be differences in understanding and comprehension of the information (Bruner, 1986).

Narratives rely on context to make sense and narrative standards for truthfulness differ from traditional logical scientific communication (Bruner, 1986). Narratives are naturally able to make connections to real-world objects without using evidence or dispute to be justified. As general truth is the basis of logical scientific communication, the precision of its truth is also what it is examined on (Bruner, 1986). However, as narrative communication is instead based on a “reasonable depiction of individual experience”, narrative communication is judged on the credibility of its experience (Green, 2006). Interestingly, both forms of communication, despite different foundations are judged with equivalent levels of “truth” (Bruner, 1986). This idea by Bruner (1986) helps us to understand why it is so difficult to counteract narrative arguments with logical scientific communication (Dahlstrom, 2014). Narratives are so intrinsically trusted that an audience will rarely accept evidence that will refute the narrative. Instead, evidence is structured to mould nicely with the narrative (McComas & Shanahan, 1999). In contrast, logical scientific communication allows an audience to understand the facts independent of the context, allowing the facts to be transferable to different contexts, or to stand alone and still be understood (Dahlstrom, 2014).

Logical scientific communication aims to provide abstract truths that remain valid across a specified range of situations. An individual may then use these abstract truths to generalize down to a specific case and ideally provide some level of predictive power regarding that specific. Narrative communication instead provides a specific case from which an individual can generalize up to infer what the general truths must be to permit such a specific to occur. In essence, the utilization of logical-scientific information follows deductive reasoning, whereas the utilization of narrative information follows inductive reasoning.
Therefore to disassemble a narrative into the pieces of factual content proves more difficult without compromising the level of understanding of the content, or even potentially making the original narrative incomprehensible (Dahlstrom, 2014).

Evolutionary benefit is presumed to be the reason for society's dependence on narratives, as the use of narratives enables an audience to comprehend a situation and process possible realities (Oatley, 1999). The narrative format is favoured when the aim is to direct people to specific behavioural intentions and also to encourage them to act out those intentions (Green, 2006).

Experience can change attitudes and, because narratives can mimic experience, there is potential for a greater change in attitude than with non-narrative formats of communication (Green & Brock, 2000). Also, for those who have not yet formed behavioural intentions, the use of narrative may potentially encourage them to do so (Green & Brock, 2000).

### 1.6.2 Narrative use for persuasion and transportation

Green (2006) suggested that depending on the situation, narrative processing may take on a strong or a weak route of influence. If the intentions of the audience are to merely be entertained they may not recognise that the information is important and may therefore be passively influenced/persuaded by the narrative. The alternative strong route of fictional processing is transportation into the narrative world, described further in this section. Because stories are held to different “truths”, transportation is less likely to occur in traditional logical scientific communication, whereas people often accept a fictional world, even if only temporarily and just for entertainment (Bruner, 1986; Rubin, 1995).
Transporting narratives are defined by Gerrig (1993) as:

Someone ("the traveller") is transported, by some means of transportation, as a result of performing certain actions. The traveller goes some distance from his or her world of origin, which makes some aspects of the world of origin inaccessible. The traveller returns to the world of origin, somewhat changed by the journey.

-Gerrig 1993, p. 10-11

Simply put, Green and Brock (2000, p.701) describe transportation into a narrative world as “an integrative melding of attention, imagery, and feelings, focused on story events.”

Today’s world is saturated with films, television and books, whereby individuals seek transportation narratives for pleasure (Green, 2006). A narrative can evoke and transform emotions that in turn affect the audience’s experience of the narrative, and these experienced emotions may influence factors beyond the narrative (Mar et al., 2011). These emotions can change not only the way we think, but can potentially have greater transformative influential effects. Therefore emotion can be central to the experience of change (Mar et al., 2011).

Transportation through narratives allows emotional and cognitive responses, which go beyond simple rote learning. Learning that encompasses both cognitive and emotional frameworks is likely to be more effective in behavioural changes (Green, 2006). Green (2006, p. S165) proposes that there are three ways in which transportation can affect readers: “creating connections with characters, reducing counter-arguing and making narrative events seem more like real experience”. The effect of a transportation narrative is to create connections with characters by providing realistic, concrete situations, and by evoking mental imagery, which combine to facilitate the mental simulation of new situations (Green, 2006). Transportation narratives are therefore a useful mechanism to prepare an audience for potential future events and behavioural responses. This subsequently may change beliefs, motivate action, provide role models
for such behavioural change and “create strong attitudes that are based on both cognition and emotion” (Green, 2006).

Interestingly, the literature shows that people can be equally engaged or absorbed by narrative through either text or film, suggesting that cognitive participation is similar for both forms of media (Green, 2008). Green and Brock (2002) suggest that transportation-imagery theory is most effective when images are coupled with story, in comparison to images alone.

In the world of science, narratives may be a key factor in altering behaviours or beliefs in individuals who are resistant to more traditional non-narrative-based methods of persuasion or information transfer (Green, 2006). As narratives result in increased comprehension, the implementation of this communication technique may be particularly useful in the science education curriculum, especially for an audience struggling with the comprehension of science-based ideas. Kreuter and colleagues (2010) showed narrative or informational videos to low-income African American women in the hope to increase mammography and found that narrative platforms of communication interventions are more effective in reducing cancer health disparities.

A primary mechanism of narrative persuasion is to transport an audience into a narrative world (Green & Brock, 2000). The role of narrative is being investigated in the area of health communication, whereby the preferred outcome is to persuade individuals toward healthy behaviour choices, or to better educate groups or populations (Dahlstrom, 2014). These studies looked at the effects of narratives on peoples’ perceptions of such topics as anticoagulant medication (Mazor et al., 2007), breast cancer (Wise et al., 2008), or vaccination (Betsch et al., 2011; Nan et al., 2015). Studies of health-related narratives have found mixed results with respect to effectiveness of using narrative over traditional methods (Winterbottom et al., 2008). Nevertheless, there is a current shift towards the use of narratives in health education (Cunningham & Boom, 2013), providing opportunities for further study of efficacy.

Green and Brock (2000) have shown that reduced transportation through a narrative resulted in reduced story-consistent beliefs and evaluations, whether the story was
labelled as fact or as fiction. Interestingly, superficial aspects, such as bad grammar and poor layout can distract audiences, and negatively impact the degree to which they are transported into the story arc (Green, 2006). Green (2006) states that in entertainment education there must be a fine balance between educational and entertainment aspects of the narrative. If one precedes the other then the message may be lost, or viewers will just stop listening (Green, 2006).

What an audience perceives as real or not makes a difference. The story is more likely to be accepted as reality if it mirrors a plausible actual event. Consequently, it is also more likely to have a greater influence. However when an audience can recognise a transparent persuasive intent and manipulation throughout the story, this can ultimately result in rejection of the narrative (Moyer-Gusé & Nabi, 2010).

1.6.3 Ethical considerations to the use of narrative

For science communicators, the use of narrative poses an opportunity to persuade audiences, although this requires ethical considerations when doing so (Dahlstrom, 2014). The questions for science communicators are when and how narratives should be used to facilitate communication of scientific facts to the public (Dahlstrom, 2014).

According to Dahlstrom (2014) there are three questions communicators should consider before using narratives to communicate science within social controversies. First, is the fundamental goal for the use of narrative for persuasion or understanding? This comes down to whether the underlying model for the situation is related to Public Understanding of Science, or Public Engagement with Science (Dahlstrom, 2014). Public Understanding of Science is aimed to fill the knowledge gap and educate the public, diminishing the controversy towards a chosen argument (Miller, Pardo, & Niwa, 1997; Miller, 2001). Whereas Public Engagement with Science is aimed to engage a larger audience and generally amplify the presence of science within a controversy but without predetermining which side of the argument the evidence supports (Dickson, 2001; Walker et al., 1999). It is understood that the use of persuasion may be justified where the overall benefit to society at large outweighs individual choice (Dahlstrom, 2014).
The second question regards the level to which scientific accuracy needs to be upheld when using a narrative to communicate science (Dahlstrom, 2014). Often content is moulded to fit the narrative. However, in the case of using narrative in science, the narrative needs to be moulded around the factual content.

The third question asks if narratives should be used at all to communicate science. Dahlstrom (2012, p.13617) states, “it would be unethical not to use narrative and surrender the benefits of a communication technique to the nonexpert side of an issue”. However, even if narrative is used in science communication, public trust in science and scientists is still a massive obstacle for communicators to overcome (Goodwin et al., 2014).

1.7 Character Modeling in adolescent resources

The degree of transportation is correlated with an individual’s level of positivity towards a sympathetic character within a narrative (Green & Brock, 2000). “When we identify with a character we imagine ourselves to be in his or her position” (Mar et al., 2011, p. 823). Emotionally connecting with a character can enhance transportation and is the core component to narrative impact (Green, 2006). Green (2006, p. S165) state, “if an individual likes or identifies with a particular character, the implications of events experienced by the character or assertions made by the character may carry special weight in shifting the reader’s beliefs.” A pre-existing similarity between the narrative character and the recipient may increase the degree of transportation and therefore the degree of change in belief (Green, 2006). Rogers et al., (1999) explain that recipients may be likely to follow in the footsteps of transitional characters that experience a transformation (a shift from a negative to a positive attitude or behavioural change). If an individual identifies with a character they may see this character as a “possible self” and may potentially avoid such behaviour that leads to the negative situation of the “possible self” (Green, 2006; Markus & Nurius, 1986). This personification enables an audience to identify and empathise with the character, modelling Western expectation of individualism (Dahlstrom, 2014).
Appel and Mara (2013) found that untrustworthiness of a fictional character is detrimental to persuasive outcomes and that character trustworthiness is a variable that can increase narrative influence or persuasion. Participants who were not deeply immersed in the narrative paid particular attention to character trustworthiness and this influenced their behaviour and story-consistent intentions (Appel & Mara, 2013).

Elliott and Lambourn (1999) investigated the role of peer-led educational approaches through the Other Drugs Peer Education (AOD) project, conducted in Auckland. The study acknowledged that young people are sceptical about parental advice if it is presented in a way that seems judgmental or hypocritical. Elliott and Lambourn (1999) also found that adolescents are more likely to embrace a peer's modelled behaviour if the peer is of a respected rank and relatable to the youth (Elliott & Lambourn, 1999). These results indicate that similar-age helpers have an advantage over professionals and parents (Elliott & Lambourn, 1999).

Normative beliefs may also be challenged by transportation through a character in a narrative. For example smoking was considered a social norm and movies “glamorised” smoking leading to positive images of smoking and perception that smoking was common. However, transportation through a character in narrative anti-smoking campaigns, focusing on social disapproval and unhealthy stereotypes of characters, helped re-shift social norms regarding smoking. This concept is termed protection motivation theory (Pechmann et al., 2003).

Creating connections with characters, providing realistic, concrete situations, and evoking mental imagery all combine to aid in transportation of the narrative and ultimately work to promote the mental simulation of events (Oatley, 2002). If the narrative is successful in transportation with the use of characters with an emotional connection, the events within the narrative are more likely to be transferred to real-life belief structures and norms in the audience (Green, 2006). To summarise, mental simulation can essentially play the role of a behavioural rehearsal (Green, 2006). Therefore tailored narratives with health promotion messages for a specific
demographic/group (in this case alcohol education for adolescents) can be an effective strategy to improve behavioural and belief change.

1.8 Development of Hypotheses

1.8.1 Hypothesis

Previous findings suggest that learners' engagement and ability to retain information is maximised with multimedia instruction (Borko et al., 2008; Moreno & Valdez, 2007; Pryor & Bitter, 2008; Smith et al., 2006; Zhang, 2005) and multimedia resources can result in higher learner satisfaction or preference (Piotrowski & Vodanovich, 2000). Furthermore, the use of narrative in science communication has been shown to require less effort for comprehension and results in heightened understanding, improved recall, shorter reading times and better transfer into long-term memory (Dahlstrom, 2014; Fisch, 2000; Glaser et al., 2009; Moore & Zabrucky, 1999; Schank, 1995). The degree of transportation from a narrative is correlated with an individual's level of positivity towards a character within the narrative (Green & Brock, 2000). Adolescents are more likely to embrace a peer's modelled behaviour if the peer is of a respected rank and relatable to the youth (Elliott & Lambourn, 1999). Based on this evidence, I hypothesise that a multimedia teaching resource for alcohol education is a more effective tool, in terms of audience understanding, preference and retention of information, than the more traditional current teaching resources.

1.8.2 Research Questions

1- **Understanding**: Can a multimedia teaching resource improve understanding of responsible alcohol consumption in adolescents, compared to a more traditional resource?

2- **Preference**: Would students prefer a multimedia teaching resource regarding responsible alcohol consumption in comparison to a more traditional resource?

3- **Retention**: Does a multimedia-teaching resource increase retention of information about responsible alcohol consumption in comparison to a more traditional resource?
1.9 Thesis structure

This first chapter has presented a review of relevant literature regarding adolescent drinking behaviour, youth alcohol education, effective teaching resources and several aspects of narrative and character modelling. This chapter explains the rationale for creation of a multimedia resource in an attempt to improve students’ understanding, preference for and retention of information regarding effects of alcohol on the brain. A more traditional education resource was also created for comparison purposes.

Chapter two provides an overview of the production of the two resources tested within this study (termed ‘the creative component’). It also provides the rationale for selection of the target audience. Chapter three describes the research design and methodology in regards to testing of the two resources, including ethics approval, recruitment and data analysis.

In Chapter four, results of the pilot and year 10 testing are presented. Students were exposed to either a multimedia alcohol educational resource, or a more traditional textbook styled resource, both presenting the same informational content. The Year 10 cohort analysis is discussed by comparing the drinking patterns and perceptions of these adolescents, as well as their knowledge of the effects of alcohol on the brain before, after and six weeks following exposure to either resource. This chapter also explores the resource preferences of the Year 10 cohort and their intentions for drinking behaviour in the future after exposure to one or the other resource. The chapter concludes by exploring the correlations between socio-economic status and ethnicity with the results and a cross analysis of how these variables relate to the effect and preference of resources on students.

Chapter five explores possible explanations for the cross analysis trends found with socio-economic status and ethnicity in the testing cohort. The chapter examines potential different learning styles of these different socio-economic groups and ethnicities and how learning styles might explain these results. Lastly, this final chapter summarises the effectiveness of these resources, recommendations, limitations, future directions and suggestions for further development of the education resources.
2. Teaching Resources for Adolescents: The Effects of Alcohol on the Brain

2.1 Introduction

The creative component of this thesis comprised two resources created to educate adolescents about the effects of alcohol on the brain. Both resources were created to be available online, and both required the same amount of time investment, but one was multimedia with a narrative thread and one was more traditional with text and images only. The multimedia resource follows the journey of one adolescent character (a 20 year-old university student) and her flat mates through a binge-drinking episode. The resource directly illustrates the effects of alcohol on the brain. This was achieved by isolating specific drunken behavioural characteristics, and relating them to areas and parts of the brain that are affected. The intention of the narrative was to encourage participant engagement and provide a sense of empathetic connection, rather than a list of facts and "did-you-knows". This resource was designed in response to studies outlined in the Introduction section, which showed that using narrative can increase comprehension (Dahlstrom, 2014), and increase the effectiveness of health intervention (Kreuter et al., 2010); and the observation that messages of harm minimisation rather than abstinence are more effective a changing behaviour (Marlatt, 2002; N. McBride et al., 2004; Skewes, 2013).

The interactive resource was designed to include several multimedia components such as: text, anatomy photography, film, narration, animations and music. These components, as well as the story arc were included to evaluate effectiveness on understanding, preference and retention of information. The content of the multimedia resource is age-appropriate, yet exciting and innovative, sparking interest with the aim of prolonging participant focus. This was tested in comparison with a second resource that is online but mimics a traditional teaching resource in a "text book" style. This traditional resource contains the same factual content, but with text and diagrammatic images only.
2.2 Target Audience

Year 10 students are the target audience for reasons discussed in the introduction chapter and summarised here:

- Year 10 adolescent brains are still developing and maturing. Drinking in these years can have long-term and harmful effects on the brain (Guerri & Pascual, 2010; Medina et al., 2008; Roaten & Roaten, 2012).
- The average first age of experimentation with alcohol in New Zealand is 14.6 years (Kypri, 2009).
- For alcohol education to be most successful it should be initiated before drinking habits have been established (Perry et al., 2002; Stigler et al., 2011).
- Testing this resource on Year 10s and gathering data about the effectiveness of the resource is crucial as “teens’ insights about effective strategies in working with teens reinforce the critical importance of having teen involvement in shaping and planning interventions” (Wickman, Anderson & Greenberg, 2008).

2.3 Writing/Script

I analysed examples of Year 10 health class teaching plans provided by a teacher from one of the participating schools in the study (Tamatea High school, Hastings, New Zealand, see Appendix I). I also explored the NCEA (National Certificate of Education Achievement) Year 10 requirements for alcohol and drug education to establish a set of guidelines for the development of this resource. Using these criteria I observed several YouTube clips to analyse what alcohol education resources were already available in New Zealand and elsewhere. Some of these online videos and resources were animation or film only and had many different target audiences. These resources were used as a template of what should be and should not be included in the multimedia resource that I was developing based on their target audience. It was important to understand what was already developed in order to establish the gaps in New Zealand alcohol education, which might be filled by the resource I created.

A storyboard was drafted to frame what information was to be included in the resource. The material was then rearranged to best illustrate a story arc that would convey the messages in the correct order of intoxication and resonate with an adolescent audience.
As the resource was targeted at Year 10 and was to be a maximum of 20 minutes I chose to focus on a few specific brain regions affected by alcohol. After developing the basic structure of information to include in the resource, I researched each individual section separately. This enabled me to reduce the number of anatomical names used in the resources and therefore the associated symptoms would be easier for this age group to understand and retain.

Much of the scientific literature was too specific for a secondary school level. I needed a balance of scientific accuracy and concepts that the target audience could understand. I used a variety of references including scientific literature and other ‘grey’ literature such as educational websites and programmes.

With the final text script I was able to draft a more detailed storyboard and include ideas of film, photography and animations to include at specific points that would best illustrate the facts. As the filming of the binge-drinking episode was natural and only loosely scripted, this narrative was flexible and was specifically crafted after footage was captured.

2.4 Photography

The Anatomy museum curator, Chris Smith and his assistant Rachna Luthra granted me permission for an anatomical photo shoot at the University of Otago Anatomy Museum. A DSLR camera was used for a three-hour session to take photographs of the brain and other anatomical parts relevant to my resource. A brain was also filmed rotating on a swivel office chair covered in black velvet material with a DSLR camera.

All images were edited using the Pixelmator programme to sharpen, remove any debris on the surrounding cloth, and align the images correctly. Specific regions of the brain that were to be isolated were coloured differently using Pixelmator. The images were then labelled and some were animated for the resource, using Keynote software (See Figure 2.1).
Figure 2.1: An example of an anatomy photo edited and labeled using Pixelmator software and used in both resources.

2.5 Recruitment of actors and film location

Wickman and colleagues (2008) report findings that support the use of older adolescents within health education.

*Health education programs are best facilitated by other teenagers or young adults who have been through a similar experience themselves. Through sharing personal experiences, peers can make their stories come alive and help teens realise that ‘yes’ this could happen to me.*

- Wickman, Anderson & Greenberg, 2008, p. 466

Wickman, Anderson & Greenberg (2008) also suggest that it is useful to create a vivid picture of risk outcomes in order to reach teens and a programme that targets these risk behaviours can empower adolescents.

Poor character trustworthiness has been shown to be detrimental to story-consistent intentions and behaviour of the audience (Appel & Mara, 2013). Therefore it was important to choose actors/characters that participants would connect with and, more importantly, trust.
Advertisement took place for paid acting roles on “Otago Flatting Goods”, a social media (Facebook) page that has a high traffic of University students (>20,000 members). The advertisement specified an “acting role, for six 18-20 year olds, with a flat appropriate for a film crew. Actors must feel comfortable drinking alcohol whilst being filmed for an alcohol educational resource.” As a result there were a number of applicants.

The applicant criteria were as follows:

- Roughly even amount of male: female ratio within the group.
- They had to be flat mates (to control for external visitors to the flat whilst filming).
- A range of ethnicities (to accommodate ethnic variety of schools in New Zealand).
- Bright, bubbly personalities (enable engagement with participants viewing the resource).
- The location of filming had to be large enough to accommodate film gear and crew.
- The location had to represent a "typical" student flat.

![Figure 2.2: Photo submitted in the successful application of actors for the film component of the multimedia alcohol education resource.](image)
Clement Dufour (filmmaker and fellow Centre for Science Communication Masters student) and I met with the actors at their flat and discussed the requirements, safety rules and payment of the job. Each actor was required to fill out a detailed questionnaire asking about their current drinking habits, levels of intoxication, known behaviour while intoxicated and any health issues in the past. These documents are confidential and no information gathered in these questionnaires was used in the study. The questionnaires were solely used to forecast potential problems that may occur whilst filming. These potential hazards were discussed before filming with the Centre for Science Communication Health and Safety Officer. A number of precautions were put in place on the night of filming, including alerting the University Campus watch of the filming and check-in phone calls/texts with nominated persons not present at the filming.

The documents signed by the actors also included actor release forms, location release forms, and photographs of their Drivers License, to ensure that all actors were over the age of 18 years.

2.6 Filming and editing

For the film portion of the creative component, ethics approval was not necessary. The actors were paid and appropriate talent and location release forms were signed (See Appendix I). The landlord of the flat gave permission for filming at the location.

Clement Dufour, a filmmaking student in the Centre for Science Communication, assisted me in the film component of the resource. Clement and I had several meetings to discuss the project and the vision in mind for the film component. The nature of this project required the majority of these clips to be filmed at night and with actors consuming alcohol on film. As the actors were drinking alcohol this resulted in a lot of planning, safety precautions and limited time to secure the shots. Ross Johnston (Director of Filmmaking at the Centre for Science Communication) suggested that the clips could not be scripted and instead I would develop a shot list of the symptoms of intoxication that I would like to show in the resource (See Appendix I). Clement and I also consulted with Robert Brown (Centre for Science Communication film mentor) to gain advice about
what techniques should be used and technical guidance for the green screening portions.

On the day of the filming we arrived at the flat with the equipment. Filming took place from approximately 1900-2300 hrs. Teri, one of the actors would be the main character in this film component. Journal clips of Teri's responses were filmed in a separate room at different stages throughout the night. The camera Clement used was a Panasonic P2 (Model number Ag-HPX250EN) and he had a portable light source.

The following day we returned at 1100 hours to the flat to film Teri's hangover and another journal clip, lasting approximately 1 hour. The footage was loaded onto the Final Cut Pro programme for editing.

![Figure 2.3: An example of a journal clip of Teri being edited within Final Cut Pro editing software.](image)

Roughly two weeks were spent editing the film (from four hours of footage to 15mins used in the resource). The shots were sequenced to follow a story arc that could be articulated from the shots gained. The anatomical rotational videos were added to the story line, followed by layering text using Final Cut Pro.
2.7 Narration/Green screening

After the film component was edited, the central actor, Teri, viewed the clips and agreed for their use in the resource. Clement and I then filmed the green screening with Teri in the Annex Theatre, Centre for Science Communication, lasting approximately two hours. Teri was filmed as she read/memorised the script. Teri was used as the narrator/presenter to reinforce her relationship with participants viewing the resource and underpin her character’s story in the narrative. Narration by Teri was recorded separately in the Centre for Science Communication sound room studio, lasting approximately one hour.

Figure 2.4: An example of Teri presenting (green screening) over an animation by Sam Scopelli, merged using the Final Cut Pro editing software.
Final Cut pro and GarageBand software were used to edit the green screening footage and the narration to choreograph these elements into the narrative. The separately recorded sound room narration clips were uploaded as podcasts ready to be inserted into the Squarespace platform described later in the chapter (Section platform and coordination 2.10).

![Figure 2.5: A snap shot of the green screening process in the Annexe theatre, Centre for Science Communication. Teri is being filmed acting in front of the green screen and I am behind the camera shooting the footage.](image)

2.8 Animations

Animations were used in the multimedia resource to compliment the factual information and provide participants with visualisations of the brain areas affected by alcohol. I had minimal funding and training in animations, so I was fortunate to get full approval from six highly regarded animators to use their animations in parts of the creative resource. Due to time limits and editing three animations were used in the final edit of the creative component (See Appendix I for full details of animations and sources). These animators
were referenced throughout the clips and will be sent the findings of the study once completed:

- Drew Berry: Walter and Eliza Hall Institute of Medical Research – The Whole Brain Catalog. Web address: [http://www.youtube.com/watch?v=zXLejFu57Wg](http://www.youtube.com/watch?v=zXLejFu57Wg); Australian Academy of Science – Inspiring Smarter Brain Research in Australia. Web address: [http://www.youtube.com/watch?v=OWD1kMh7Fyl](http://www.youtube.com/watch?v=OWD1kMh7Fyl). Sourced via YouTube.

- Turning Point Alcohol and Drug Centre: Under construction: Alcohol and the teenage brain. Web address: [http://www.youtube.com/watch?v=g2gVzVIBc_g](http://www.youtube.com/watch?v=g2gVzVIBc_g). Sourced via YouTube.


2.9 Music

Bryce Campbell, an Electro-swing DJ living in London, provided samples of his music to use in the multimedia resource. Electro-swing uses references from older swing music, so it will therefore not date as rapidly as current popular music. The styles of tracks chosen match the tone and energy of each clip, with the aim of exciting participants and prolonging focus.

2.10 Platform and coordination

Once all components of the multimedia resource were developed, the 15-minute film was segmented into short one-two minute clips. The layout of the multimedia website was designed to complement the clips, images and text.

The platform used to develop this creative component was the website builder-Squarespace. Squarespace is designed for users with little or no coding capabilities to build a website. The Squarespace platform is able to host several multimedia components such as text, galleries, images (with zoom capability), embed videos and podcasts and surveys, and create a password-protected site with a custom domain. The plan provided unlimited pages, galleries, storage, bandwidth and contributors. Therefore, students could access the website (when given the password) from any
device with Internet access and the number of participants using the website at the same time, or the total number of participants in the study would not affect the reliability of the website. The design tools within Squarespace enabled a clean, professional finished product. The University of Otago is registered as one of Squarespace’s educational programs, which entitles University of Otago students to a 50% discount on the annual fee. In order to test the effectiveness of the multimedia website another separate website domain also had to be purchased to develop the "traditional" teaching resource with plain text and diagram imagery only.

Figure 2.6: Examples of both website resources: a) and c) traditional plain text- and diagrammatic imagery-only resource examples. b) and d) multimedia website examples.
Teri's self-reflection of her drinking was filmed through a journal clip after she had viewed the website. These last two clips were edited and uploaded to YouTube to be embedded into the Squarespace multimedia website.

2.11 Resource Layout Design

**Resource A**
Traditional: [www.yourbrainonbooze.squarespace.com](http://www.yourbrainonbooze.squarespace.com)
Password: ScicommResourceA
Website name: Your Brain on Booze
This website does not contain any extra colour, imagery, banners, or design detail. Within this resource there is only text (no character or narrative) and only diagrammatic images of the brain. These images are not within a gallery, nor can they be magnified.

**Resource B**
Multimedia: [www.smashed.squarespace.com](http://www.smashed.squarespace.com)
Password: ScicommResourceB
Website name: Your Brain on Booze
This website includes the multimedia components of film, journal clips, anatomical photography, animations, narration, podcasts, music, text and narrative. The combination of these components means that students can read, listen, or watch each section, depending on the participant's personal preference.

**Website layout**
**Home:** This provides students with essential information regarding this resource, the tests and safety information.
Entry test: Qualtrics powered survey and multi-choice test embedded within the page with safety messages throughout (10 minutes).

Resource: (20-30 minutes):

- **Meet the crew** (Resource B multimedia only): An opportunity for the viewer to ‘meet’ the flat mates and sets the scene for the binge drinking session. In this section of the resource the viewer also meets Teri our main character in the first journal clip.

- **Mechanisms of Alcohol**: The first content-based section of the resource that focuses on how alcohol works inside your body. This section covers how to understand blood alcohol (BAC) levels and standard drinks.

- **Alcohol’s effect on the brain**: This section focuses on the overall effect of alcohol on the brain and includes detailed animations that show these effects.

- **Stages of intoxication**: This section of the resource is divided into a further five sub-sections to illustrate separate stages of intoxication.
  
  - Stage 1 Euphoria: The initial stages of alcohol intoxication and its effects on the personality through compromising the frontal lobe of the brain.
  
  - Stage 2 Impairment: Explaining why there is a loss of coordination and increased urination through details of alcohol’s effect on the cerebellum and the water regulation centre of the brain.
• Stage 3 Confusion: the description of what it means to temporarily black out (not remember) and the effect on the parts of the brain responsible for this, as well as the repercussions of compromising the hippocampal region of the brain.

• Stage 4 Stupor: The brainstem's reaction to alcohol and symptoms of vomiting.

• Stage 5 Coma: Understanding what it means to pass out (fall asleep or unconscious) and how this can be potentially life threatening.

- **The Hangover:** Video and journal clips of the hangover and description of what our bodies and brains are going through.

- **After the hangover:** Understanding that there are long term consequences for binge drinking, especially during adolescence. This section includes tips on safer drinking and safety messages.

**Exit test:** Qualtrics powered survey and multi-choice test embedded within the page with safety messages throughout (five minutes).

Note: Resource A provides the same informational content, but is only illustrated with informational text and diagrammatic images of the brain.
3. Multimedia vs. Traditional teaching resources

Creation of two teaching resources was described in detail in the previous chapter. This chapter describes research methods used to determine relative effectiveness of those two resources. Each was an educational resource containing the same information designed to improve understanding of the consequences of alcohol consumption on the brain and was aimed at an adolescent age group (14-16 years of age). The resources differed only in the style of delivery: one was multimedia with text, video, audio, music, and animations and narrative, while the other mimicked a traditional textbook style with text and images only. My hypothesis is that the use of a contemporary multimedia approach would be preferred by current students and would be more effective for their understanding and retention of information when compared to a traditional textbook styled resource.

3.1 Research design

This research was an empirical study using mixed qualitative and quantitative methods. Both interventions were pilot tested on first year University students enrolled in the Human Body Systems 191 (HUBS 191) course at the University of Otago before being trialled in 10 high schools around New Zealand.

3.1.1 Intervention

Initially all participants took a pre-test to collect baseline data of their understanding of the effects of alcohol on the brain. Following the pre-test, the participants were split into two groups (randomly), receiving either of the two interventions (traditional resource or the multimedia resource). Participants were given 30 minutes to explore the resource they were allocated and were then asked to fill out a post-viewing test. The purpose of this post-test was to determine the extent to which new knowledge was imparted by each of the resources by comparing results with the pre-test understanding. In order to test longer-term retention of information, participants were then asked to take the test again after three-six weeks (Year 10) and three months (University Pilot test) (Table 3.1)
and Table 3.2). Each component was performed on a computer using the website platform described in Chapter 2.

Table 3.1: The research tools for data collection.

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test (10mins)</td>
<td>Quantitative 20 questions multi-choice test and survey.</td>
</tr>
<tr>
<td>Resource exposure (30mins)</td>
<td>½ group exposed to traditional resource (Group A), ½ group exposed to multimedia resource (Group B)</td>
</tr>
<tr>
<td>Post-test after resource exposure (5mins)</td>
<td>Quantitative 20 questions multi-choice test and survey. Qualitative open-ended question.</td>
</tr>
<tr>
<td>Follow up-test after resource exposure (5mins)</td>
<td>Quantitative 20 questions multi-choice test and survey. Qualitative open-ended question.</td>
</tr>
</tbody>
</table>

Table 3.2: Overview of cohort data collection method.

<table>
<thead>
<tr>
<th>Cohort</th>
<th>Pre-test (10min)</th>
<th>Resource (30min)</th>
<th>Post-test (5min)</th>
<th>Follow up test (5min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot Study</td>
<td>All</td>
<td>Group A</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 10</td>
<td>All</td>
<td>Group A</td>
<td>All</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Group B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.1.2 Link between Creative and Research Components

The creative component (teaching resources) was developed to communicate the scientific understanding of the effects of alcohol on the brain to adolescents. The ability of these resources to communicate effectively was tested, as judged by short and long-term knowledge acquisition by comparison with pre-viewing knowledge. This testing, the results and their analysis form the research portion of the thesis (see Figure 3.1)
3.1.3 Science Communicated

In this thesis, I aimed to communicate the effects of alcohol on the brain, by accentuating anatomical and physiological changes that take place upon exposure to alcohol. The long-term effects of alcohol exposure to the developing brain were also covered. The scientific literature clearly demonstrates immediate, short, and long-term developmental consequences of alcohol consumption. By conveying this information to adolescents, the aim of this science communication resource was to enable adolescents to make more informed drinking decisions. This resource is designed to be used in conjunction with other resources and eventually as part of a wider drug education module. I hypothesised that after resource exposure, students would be able to understand the direct effects that alcohol has on the brain and to associate symptoms of intoxication to specific brain regions. I further hypothesised that the style in which the information was communicated (multimedia vs. textbook style) would affect the degree to which participants acquired and retained this new knowledge.

3.1.4 Questionnaire design

Demographic, religion and ethnicity questions in the survey were modelled from the 2013 New Zealand Census. Questions relating to alcohol use were modelled from the Youth2000 Survey Series (2001, 2007 and 2012) with permission from the authors within the Adolescent Health Research Group, University of Auckland. Matching some
questions in this study allowed for consistency with the *Youth2000 Survey Series*. Full questionnaires used in the study can be found in Appendix II.

Multiple-choice questions and answers were developed about the scientific content of the resource. The university pilot study had a total of 17 “content” questions (questions relating to the effect of alcohol on the brain), and the Year 10 cohort had a total of 20 “content” questions. Correct answers were summed to give a total score that served as a measure of knowledge, with comparison of pre and post scores as a measure of learning.

Questions evaluating the effectiveness of the resource, what component (text, film, narration) participants preferred to use and questions regarding intention of drinking behaviours were asked at the end of the post survey.

Some categorical answers were added to the questionnaire after pilot testing and initial conversations. For example in the question that asks if students consider themselves to be a binge drinker, the answer "I'm not sure what a binge drinker is" was added to possible answers. This came after the realisation that Year 10s have a limited vocabulary concerning alcohol and many did not know what a binge drinker was.

Google Forms powered the university pilot pre, post and follow-up tests. However, when analysing these data, Google Forms had limited analytic tools and Qualtrics (a another type of software to generate surveys and forms) was used to deliver the Year 10 cohort pre, post and follow-up tests. Qualtrics software provided the ability to code for a total score for each participant and tests were easily managed and organised for analysis using SPSS statistical software. The University of Otago is also registered with Qualtrics, which enables students to have free access to the software. The Qualtrics tests were embedded within the website.

3.2 Participants

Previous studies support the targeting of Year 10 (age 14-15 years) students as the testing cohort since it appears that alcohol harm reduction education is more beneficial when it is provided before adolescents establish a drinking pattern (Perry *et al.*, 2002;
Stigler et al., 2011). New Zealand self-reported age of first the alcoholic drink is 14.6 years (Kypri, 2009), therefore the Year 10 age bracket is an appropriate time to start harm reduction alcohol education.

The university cohort was used as a pilot test due to the large class number and access to the class. This cohort was also useful for information gathering purposes and identification of obscure/hard questions enabling changes to be made before starting to test the Year 10 cohort.

3.2.1 Recruiting

Before any recruiting was conducted, approval was granted from the University of Otago Ethics Committee, as described in Section 3.2.2.

University students

Professor Dave Grattan, coordinator of the Human Body Systems (HUBS) first year Health Science paper HUBS191, supported the pilot testing of this study. Participation was optional for students. Philip Kelly, the professional practice fellow for HUBS191 helped to embed the resource within the paper’s Blackboard™ system. Blackboard is used to communicate notices and resources to the students; its use ensured that all students with access to HUBS191 resources had the opportunity to participate in the study. A notice about the study was posted on the Blackboard virtual wall to direct students to the resource website.

I attended the HUBS191 review lecture for semester 1, 29th April, 2015, and briefly spoke about the nature and purpose of the study to all students in all streams, showing a short trailer (www.youtube.com/watch?v=OE4Dhv3BVLM).

Volunteers were encouraged to take part in the study with an incentive to go into a draw to win one of two pizza vouchers if they completed the tests. The two pizza vouchers were donated from The Esplanade pizzeria and bar, Saint Clair, Dunedin. The resources were open for 72 hours and winners of the pizza vouchers were notified within one week thereafter.
The students who completed both pre- and post-tests were emailed three months later with a link to the follow-up test to complete. Those who completed the five-minute follow-up test also went in the draw to win a second round of pizza vouchers (donation from The Esplanade). The follow-up test was left open for a second week and a reminder email was sent to participants. Winners were notified one week after the reminder email of the follow-up test.

**Year 10 students**

Sixteen schools were contacted via email in the Otago, Southland and Hawkes Bay area (see Appendix III). The email also included a link to a trailer specifically for schools. To view the trailer on YouTube see: [www.youtube.com/watch?v=CleQX2rSsLE](http://www.youtube.com/watch?v=CleQX2rSsLE).

Staff members contacted were either Head of Department in Health and/or Physical Education, or Year 10 Deans. If there was interest in participation a meeting was set with myself and staff members to showcase the resources and discuss details of the study. A total of ten schools participated in the study (Table 3.3). These schools provided a wide range of ethnicities, co-education/single-sex schools and socio-economic decile ratings. Decile ratings are a score generated by the Ministry of Education. This number is calculated from information provided from the census and takes surrounding school homes income, job, beneficiaries into consideration (http://www.ero.govt.nz).

<table>
<thead>
<tr>
<th>Southland</th>
<th>Otago</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aurora College</td>
<td>Kings High School</td>
</tr>
<tr>
<td>Southland Boys High School</td>
<td>Taieri College</td>
</tr>
<tr>
<td>James Hargest College</td>
<td>St Hilda's Collegiate School</td>
</tr>
<tr>
<td>Hastings</td>
<td>Bayfield High School</td>
</tr>
<tr>
<td>Tamatea High School</td>
<td>Queens High School</td>
</tr>
<tr>
<td>Flaxmere College</td>
<td></td>
</tr>
</tbody>
</table>
3.2.2 Ethics

Before applying for ethics approval this project needed approval by the Ngai Tahu Research Consultation Committee. The Committee granted approval and considered the research to be of "interest and importance" (see letter in Appendix III).

Pilot testing with the university student cohort was considered low risk and so received a Category B ethics approval, as the students were over the age of 18 years (Category B application attached in Appendix III). Approval of the proposal was granted (Reference Number D15/144; see approval letter attached in Appendix III).

Ethics approval from the Department of Education was not necessary for the Year 10 cohort of this research. However, ethics approval for use of the resource with minors was needed from the full University of Otago Human Ethics Committee (see Category A ethics application and receipt in Appendix III).

Due to the nature of the project there was sensitivity to public perception and potential impact on the study at the University of Otago. Because of the potential for harm the ethics committee required extra precautions. The committee declined the first proposal with recommendations before resubmission (see Appendix III for full decline letter). Below are explanations of the recommendations, queries and measures taken to satisfy the University of Otago’s Human Ethics Committee and gain approval.

- Consultation with Alcohol and Other Drug Services

Before testing took place the resources were presented at the Alcohol and Other Drug Forum and I received feedback and direction from many health and social workers within this area. Regular meetings were then held with Scott Blair (M.Ed Counselling, MNZAC), the Otago area Manager for Adventure Development Youth Services, regarding training, protocols and precautions to take when testing and working with schools.

- Student researcher training

I participated in a one-day course in alcohol and other drug screening and brief intervention training before school testing took place. Christie et al., (2013) developed
this course specifically for child and adolescent mental health workers. This course better equipped me with the skills to identify and manage self-reports of alcohol-related abuse and have a better understanding of the appropriate referrals for participants. Scott Blair (Adventure Development Youth Services) ensured that I had the correct training for appropriate referral and understanding of which services were better suited to the participants.

- Wallet-sized cards

A wallet card was designed and handed to participants after testing, as followed by the *Youth2000 Survey Series* study. This wallet card included contact names and numbers of the researchers and youth alcohol services specific to their school region (developed with consultation of Scott Blair, Otago Manager, Adventure Development) (see Figure 3.2).

![Wallet cards](image)

**Figure 3.2:** Front and back of wallet-sized cards that were handed to high school participants after testing. Participants were free to take these cards with them.

-Testing “self-reporting” Protocol

The inherent risks in regards to this research are:

- There are potential risks of direct questioning causing adolescent distress or trauma related to memories or concerns of alcohol-related abuse.
- Participants and families suffering perceived or actual negative consequences as a result of the participant self-reporting alcohol-related abuse.
- Participants’ idolising/engaging in risky drinking as depicted in the resource that they may otherwise not be exposed to.
Alternatively information gathered from external sources (parent report, adolescent recall, teachers, youth workers) may not accurately represent the entirety of the adolescent’s understanding of alcohol intoxication on the brain, their current alcohol use and experience. There may be direct benefits to individuals from participation in the study, however an even greater benefit stands to be gained by society at large.

Due to the dilemmas related to the risks inherent in adolescents’ self-reporting alcohol-abuse in the context of this research, a precautionary protocol to respond to self-reporting was developed with reference to Christie et al., (2013), Knight, (2000); Powell et al., (2012) (see Table 3.4).

<table>
<thead>
<tr>
<th>Table 3.4: In testing protocol in relation to self-reporting (developed with assistance with Scott Blair, Otago Manager, Adventure Development). Note: There was no instance during testing where this protocol was needed.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>In testing protocol</strong></td>
</tr>
<tr>
<td>If the student researcher during the testing recognised a participant in distress, they would further supportively provide the option of withdrawal and ask if the participant would like to speak to someone. The student researcher would also offer the participant a short break, as the student researcher acknowledged that some of the questions might be difficult to answer.</td>
</tr>
<tr>
<td>If either of these options appeared to relieve the participant’s distress the student researcher would work with the participant to identify a counsellor or teacher at school with whom the participant felt comfortable to speak with.</td>
</tr>
<tr>
<td>If the participant agreed to a meeting the student researcher would schedule a meeting between the participant and the chosen school staff member.</td>
</tr>
<tr>
<td>The student researcher would also offer to take the participant directly to the school counsellor/staff member to provide the participant with support.</td>
</tr>
<tr>
<td>If the participant refused to speak with a school staff member, but continued to show distress the student researcher would inform the school counsellor of the distress, but arrange a meeting with an external professional. In this way the school personnel were made aware of the problem, but no data from the research itself was revealed.</td>
</tr>
</tbody>
</table>

**Anonymity**
The advantage of this research being on a website platform was provision to participants with a strong format for anonymity, as the students were not responding to an interviewer, or in front of other participants.

Should a participant self-report alcohol-related abuse either in person, or within the resource, no identifying details or information from the research was passed on to the school or external professionals. The only information that was passed on would be that the participant experienced distress as a result of exposure to the study and needed follow-up guidance and meetings. This would be explained to the participant.
Information sheet

The *Youth2000 Survey Series* information sheet was used as a guideline to simplify the participant and parental information sheet for this study. Information sheets for participants were further developed to ensure understanding to the greatest extent possible, with the use of developmentally appropriate and simple language (see Appendix III). There had to be sufficient and easy to understand information for parents to make informed decisions about whether they should consent to their child taking part in the study. To achieve this, there was a disclosure to parents within the information sheet about potential self-reporting of alcohol-related abuse and the procedures in place should that happen, as well as a synopsis of the material that was included within the resource (details of explicit drinking behaviour) (see Figure 3.3).

Included in the parent information sheet was a statement encouraging parents to contact the school or the student researcher to view the resource in its entirety. Three parents contacted the student researcher and viewed the resource out of all parents of students that took part in the study. The links and passwords to the resources were not provided within the parent information sheet, as the children and other members of public may then have access to the resource outside of the testing conditions. The children's information sheet was embedded as a link before the start of the entry survey and students were encouraged to read this information sheet in its entirety before beginning. The researcher reminded students that they could withdraw from the research at any time.
a)

What will happen if my child self-reports alcohol abuse or is concerned about their or other’s alcohol use?

If your child self-reports alcohol abuse of some kind to a staff member/doctor/researcher, your child will be put in contact with a professional, or someone appropriate whom they can talk to. There are safety messages with a list of appropriate people your child can speak with following sensitive questions throughout the survey. Your child will also receive a wallet-sized card with contact numbers for staff members, the researchers involved and helpline professionals. The student researcher present in your child’s class will remind the class of these resources and that if your child feels uncomfortable they may withdraw from the research at any point.

Who is conducting the research?

The research is organised by the Centre for Science Communication at the University of Otago in collaboration with the Brown-Health Research Centre. The postgraduate research student present in your child’s class with their teacher will be Shanti Campbell.

If you want to find out more about this research and how it will be organised at your child’s school, ask at your school office to speak to a staff person who is working with us, or contact one of us directly. We are happy to answer your questions.

Thank you for your time in considering this request.

Shanti Campbell
Centre for Science Communication
Telephone +64 3 479 7999
Email shantiac@unik.com.au

and

Prof. Nancy Langanelli
Centre for Science Communication
Telephone +64 3 479 7885
Email nancy.langanelli@unik.com.au

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b)

The purpose of this information sheet is to inform you as a parent and/or whānau member about this research. Please read this information sheet before deciding whether or not to consent to your child’s participation. If you decide for your child to participate we thank you. If you decide for your child not to take part there will be no disadvantage to your child and we thank you for considering our request.

What is this research for?

The aim of this research is to compare effectiveness of two teaching resources regarding effects of alcohol on the brain. This project is part of the requirements of a Master of Science Communications being undertaken by Shanti Campbell. The data your child will provide will be part of Shanti’s research which will be reported in her MScComm thesis and will inform future development of teaching resources in New Zealand.

What participants are needed?

Your 10 secondary school students are being sought for this study. Your child’s school has shown interest in participating in this research and as a result your child’s class has been asked to take part. The study will include schools in Otago, Southland and the Hauraki region, which have agreed to participate. There will be approximately 1000 year 10 students involved. Every response is valuable, as these numbers are needed to help determine effectiveness of the resource.

As a result of participation your child will be involved in a nationwide study, the first of its kind regarding educational resources about alcohol and the brain and the effectiveness of the resources for our youth.

What will my child be asked to do?

Step 1 (~ 10 minutes): Your child will be asked to complete an online questionnaire.
Step 2 (~ 20 minutes): Your child will be assigned to one of two groups to use an online teaching resource involving the effects of alcohol on the brain.
Step 3 (~ 5 minutes): Your child will be asked to complete a second online questionnaire.
Step 4 (~ 5 minutes): In three months your child will be asked to complete a third online questionnaire.

Is the questionnaire private? Will anyone know what answers my child gives in the questionnaire?

The raw data that will be collected will include personal information such as your child’s name, gender, age, etc. This raw data will also include information about your child’s alcohol consumption. Identifying information will only be used to compare pre, post and follow-up responses. After matching the responses the results will be coded and then made anonymous.

Your child’s anonymity will be preserved.

What will happen to the information from the research?

The data collected will be stored securely on a password protected server and only the researchers will be able to gain access to it. Anonymous data obtained as a result of the research will be retained for at least 5 years in secure storage, and in most cases kept indefinitely.

The results of the project may be published and will be available in the University of Otago Library (Dunedin, New Zealand), but will preserve your child’s anonymity.

What is in the resource?

The educational resource being tested contains a series of short film clips depicting young adults (20 years of age) drinking alcohol in their face. The series of clips identifies the stages of intoxication symptoms such as euphoria, impairment, confusion, slurred and the coma stage. Footage within these resources are exceptionally heavy binge drinking and the outcomes of this such as loss of coordination, slurring of words and vomiting.

You are welcome to contact Shanti Campbell to preview the resource online before giving consent if you would like. (See below for Shanti’s contact details.)

What if I don’t want my child to participate in the research?

If you do not want your son or daughter to participate in the research please do not sign the consent form. You can contact the school office and ask that the school remove their name from the participant list. You may withdraw your child from participation in the project at any time and without any disadvantage to your child.

What if my child doesn’t want to take part in the research?

Taking part in the research is voluntary – we hope the students will agree to take part, but they don’t have to. Students who take part can decline to answer any question and can withdraw from the research at any time for any reason.
Figure 3.3: a) The front cover of the information sheet pamphlet sent to parents of students to participate in the study. b) The inside of the information sheet pamphlet sent to parents of students to participate in the study. The pamphlets were printed on blue paper, double sided, and folded with the consent form placed within. The pamphlets were then distributed out to schools.

-Protocol for consent
Due to the nature of this resource exposing minors to vivid images of excessive drinking, a protocol for consent was a central factor surrounding the concerns of the ethical committee. Participants were reminded of their right to withdraw themselves at any point with no disadvantage to them, and consent of school principals and parents had to be obtained before testing could take place.

-Briefing and Debriefing Protocol:
A script was developed and read aloud to the participants directly before and after resource exposure (see table 3.5).

<table>
<thead>
<tr>
<th>Table 3.5: Script for student researcher for resource testing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student researcher Shanti Campbell will be present along with the teacher in each Year 10 class being tested. When the class enters the computer laboratory, the students will each choose a computer. Half of the computers will be assigned the “traditional” teaching resource and the other half of the computers will be assigned the “multimedia” teaching resource.</td>
</tr>
<tr>
<td>Once the students have taken their seats the teacher will introduce Shanti Campbell. Shanti Campbell will then read the script as follows to the students.</td>
</tr>
<tr>
<td><strong>BRIEFING SCRIPT:</strong> “Hello my name is Shanti Campbell. I am a Masters student at the Centre for Science Communication, at the University of Otago. I have developed an alcohol education resource that I would like for you to try out. Your school and parents have given their permission for you to explore this resource. However if you feel uncomfortable with this and do not want to take part at any point of the class today, you are free not to participate in this research. This resource is about the effects of alcohol on the brain and you may be asked some sensitive questions regarding your current alcohol use and views. All answers to these questions will be confidential. My supervisor and I will be the only people that see your responses until all of the responses are made anonymous. Understand that what you say is private. Your teachers and parents will not know what you say. Your friends will not know what you say. If anything in this resource, or any of the questions we ask concern or upset you, you can talk to either myself,”</td>
</tr>
</tbody>
</table>
Your teacher present today, your school counsellor, or contact one of the numbers or websites at the bottom of each page. These contact details will also be given to you at the end of the class in a wallet card for you to keep.

Today's period will include a 5-10min pre-test, you will then have 25-30 minutes allocated to explore all sections of the resource and a 5 minute post-test.

When you get to the first test there will be a link for you to click on to access an information page that will give you more detail about this study. Please read this information sheet in full before you begin.

Please follow all instructions on the website, complete all sections and wear your headphones at all times. If you have questions at any point raise your hand and I will come and answer your question.

Some of you may finish earlier than others. If you do finish early please remain in your seat with your headphones on, raise your hand and I will come to see you.

You are reminded that participation in this study is voluntary and you are free to withdraw at any point without any disadvantage to you. Are there any questions at this point? (Answer any questions)

You may begin.”

DEBRIEFING SCRIPT: “I acknowledge that some of the questions my have been difficult to answer today and I thank you for taking the time to explore the resource and answer these questions. Your input will be a huge help in designing alcohol education resources for others your age.

In about a month’s time there will be a follow-up test for you to complete. This test should take around 5 minutes.

If you have any questions or would like to speak with me about the resource today I will be here after class. On your desk you will also see a wallet-sized card with all of the contact information for some other people that you can talk to.

Thank you.”

-Use of minors as participants
The University of Otago Human Research Ethics Committee was of the view that the video aspect of the educational resource depicting young adults (20 years of age) in a university setting could be seen as glamorising and promoting consumption of alcohol to this younger target age group of 14-16 year olds. The concerns of the Ethics Committee were acknowledged; however we believe in the validity of the approach of showing intoxication in its entirety, including the first stages that can be seen as ‘fun’ or
pleasurable. There is strong evidence throughout the alcohol education literature suggesting that harm reduction approaches are much more successful in reducing substance abuse, over abstinence-based approaches. The literature supports targeting this resource at Year 10s because previous studies have shown that this is the age that young New Zealanders first start to experiment with alcohol and because alcohol education has been shown to be most effective when provided at an age before drinking habits have been established (as discussed in Chapter 1). The Ethics Committee suggested that we seek guidance from a local expert in alcohol-related research within the University. The consultation resulted in advice to add safety messages throughout the resource (See Figure 3.4).

**Please note:** These journal clips are Teri’s views and are not representative of the wider Otago student population, nor the views of the University of Otago.

Thank you for answering these questions. If this experience has upset you and you wish to talk to someone, remember that you can talk to someone here. You can also talk to the schools counsellor, health staff or Youthline (Phone: 0800 376633, free text 234, or visit their website).

**For the purpose of this resource the footage throughout shows excessive drinking and should not be viewed as normal drinking behaviour or copied in any way.**

**Figure 3.4:** Examples of safety messages that are distributed throughout the resources as recommended by the Ethics committee and local experts within the University of Otago.

- **Representing risks**

Concerns were also raised about not representing other important risks involved with alcohol. Secondary risks of alcohol intoxication (for example, injury, sexual risks, drink driving, pregnancies) are not discussed in this resource. These secondary risks were intentionally not included within this resource, as most programs already in place within secondary schools focus on these secondary risks. Additionally, the aim of this resource was to focus on the effects of alcohol specifically on the brain, with the idea that this resource might be used in conjunction with other resources already in place. The risks that are discussed in the resource relating to health damage and death as a
result of alcohol intoxication are relevant as they are a direct outcome of alcohol intoxication to the brain. To exclude these risks (because other external risks are not discussed in this resource) is to poorly communicate the effect that alcohol has on the brain and could mislead students about the severity of these repercussions.

-Disclaimers and links
A disclaimer was added in the introduction section of both resources explaining that this resource focused on the direct effects of alcohol intoxication on the brain and does not discuss any of the secondary effects that can happen as a result of being intoxicated, as discussed above.

Some other precautions taken during testing involved including a disclaimer about how this resource depicts excessive drinking and should not be copied. This explicitly told participants that the prevalence of secondary school binge drinking is decreasing and that it is okay not to drink. A further disclaimer footnote was included advising that the journal clips in the multi-media resource are the views of Teri herself (the central character), not the wider student population, or the views of the University of Otago. Lastly, the Health Promotion Agency recommendations for under 18s and a link to their website was included at the end of the resource.

At the subsequent Ethics Committee’s meeting, conditional approval was granted for the research. To meet their conditions some small additional changes were made, as well as consulting with an additional expert in the area of alcohol research associated with the University of Otago. Following these modifications, the Human Ethics Committee granted approval for the study: reference number: 15/093 (approval letter Appendix III).
3.3 Data Analysis Methods

3.3.1 Qualitative analysis methods

Two questions in each test required three-word answers associated with alcohol or why people use alcohol. To process this qualitative data the answers were analysed and streamed into their root words and word clouds were developed through a Wordle application online (http://www.wordle.net/).

The open-ended question at the end of the post and follow-up test was thematically analysed and sorted into themed responses (Table 3.6). Responses were edited to correct spelling and grammar for ease of reading. In no case was wording removed or changed. The responses were coded for preference of content, resource or delivery of content. Then all responses were coded for themes and the percentages for each thematic response was calculated.

<table>
<thead>
<tr>
<th>Example quotation</th>
<th>Preference</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>I disliked the listening to the audio as I am not a good listener.</td>
<td>Disliked Delivery</td>
<td>3</td>
</tr>
<tr>
<td>It was boring and I’m not good reader or speller so didn't understand some of it.</td>
<td>Disliked Resource</td>
<td>2</td>
</tr>
<tr>
<td>I don’t know</td>
<td>Inconclusive</td>
<td>1</td>
</tr>
<tr>
<td><em>Unanswered</em></td>
<td>Unanswered</td>
<td>0</td>
</tr>
<tr>
<td>I liked the fact that you could choose from multiple media, and that the videos portrayed a realistic story.</td>
<td>Liked Resource</td>
<td>-1</td>
</tr>
</tbody>
</table>
3.3.2 Quantitative analysis methods

Quantitative data collected through the pre, post and follow-up tests were continuous (age) or categorical (Yes/No/I’m not sure). Descriptive statistics (percentages, graphs) were performed using a combination of Microsoft Excel and IBM SPSS Statistic Version 22 (IBM, 2013). IBM SPSS was used for all statistical analysis.

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Data</th>
<th>Data source within study</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Understanding:</strong> Is there a difference in factual learning after exposure to a multimedia-teaching resources about responsible alcohol consumption in adolescents, compared to a more traditional resource?</td>
<td>Quantitative: pre- and post-multiple choice test</td>
<td>Year 10 cohort and Pilot HUBS cohort</td>
<td>Statistical analysis of quantitative results (Wilcoxon signed-ranks test and Mann-Whitney U test)</td>
</tr>
<tr>
<td><strong>2. Preference:</strong> Do students prefer a multimedia-teaching resource regarding responsible alcohol consumption compared to a more traditional resource?</td>
<td>Pre- and post-quantitative questionnaire. Qualitative open-ended question coded and interpreted.</td>
<td>Year 10 cohort and Pilot HUBS cohort</td>
<td>Quantitative (Wilcoxon signed-ranks test and Mann-Whitney U test)</td>
</tr>
<tr>
<td><strong>3. Retention:</strong> Does a multimedia-teaching resource increase memory retention about responsible alcohol consumption in comparison to a more traditional resource?</td>
<td>Quantitative: follow up test</td>
<td>Year 10 cohort (3-6 weeks) and Pilot HUBS cohort (3 months)</td>
<td>Statistical analysis of quantitative results against follow-up results (Wilcoxon signed-ranks test and Mann-Whitney U test)</td>
</tr>
</tbody>
</table>
Paired and non-paired non-parametric statistical tests were conducted on the scores of the participants, followed by Wilcoxon Signed Ranks Tests and Mann-Whitney $U$ Tests to determine if any of the results were significantly different ($p<0.05$) (Table 3.7). Effect size used to interpret patterns and relationships between variables and scores concerning how effective the multimedia alcohol education was in comparison to the more traditional resource that had plain text and diagrams only.

Relationships between scores and demographic data, habitual drinking patterns and perceptions, preferences and future behavioural intentions were analysed using a combination of statistical analysis methods outlined in Table 3.8.

<table>
<thead>
<tr>
<th>Statistical test</th>
<th>Assumptions</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wilcoxon signed-rank test</td>
<td>- Data are paired and come from the same population.</td>
<td>$r = Z/\sqrt{N}$</td>
</tr>
<tr>
<td></td>
<td>- Each pair is chosen randomly and independently.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The data are measured at least on an ordinal scale (cannot be nominal).</td>
<td></td>
</tr>
<tr>
<td>Mann-Whitney $U$ test</td>
<td>- Both groups are independent.</td>
<td>$r = Z/\sqrt{N}$</td>
</tr>
<tr>
<td></td>
<td>- The data are measured at a continuous or ordinal level.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The distributions of both populations are equal.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Data are independent observations</td>
<td></td>
</tr>
<tr>
<td>Chai squared test</td>
<td>- The two variables are measured at an ordinal or nominal level.</td>
<td>$V = \sqrt{x^2/N(k-1)}$</td>
</tr>
<tr>
<td></td>
<td>- The two variables consist of two or more categorical, independent groups</td>
<td></td>
</tr>
<tr>
<td>Cochran’s $Q$ test</td>
<td>- One dependent variable with two, mutually exclusive groups.</td>
<td>$V = \sqrt{x^2/N(k-1)}$</td>
</tr>
<tr>
<td></td>
<td>- One independent variable with three or more related groups.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The cases are a random sample from the population of interest.</td>
<td></td>
</tr>
<tr>
<td>McNemar’s test</td>
<td>- One categorical dependent variable with two categories.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The two groups of your dependent variable must be mutually exclusive.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The cases are a random sample from the population of interest.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3.9: Cohen’s convention’s interpretations for effect sizes of Cohen’s D, Effect size and Cramer’s V results of size of effect. Table adapted and modified from SPSS Survival Manual 4th Edition, (Pallant, 2010).

<table>
<thead>
<tr>
<th>Size of Effect (Cohen’s Convention)</th>
<th>Cohen’s D (d) (standard deviation units)</th>
<th>Effect Size (r) (effect size correlation)</th>
<th>Cramer’s V (1df)</th>
<th>Cramer’s V (2df)</th>
<th>Cramer’s V (3df)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>.2</td>
<td>.1</td>
<td>.1</td>
<td>.07</td>
<td>.06</td>
</tr>
<tr>
<td>Medium</td>
<td>.5</td>
<td>.3</td>
<td>.3</td>
<td>.21</td>
<td>.17</td>
</tr>
<tr>
<td>Large</td>
<td>.8</td>
<td>.5</td>
<td>.5</td>
<td>.35</td>
<td>.29</td>
</tr>
</tbody>
</table>

Bar and Pie graphs were deliberately chosen to present the data. For this project a number of types of presentations were examined and it was thought that these graphs represented the findings most effectively. Text, tables and percentages were also used to present other parts of data. Word clouds were used to display the words associated with alcohol and why people use alcohol.
4. Results and Discussion

4.1 University Pilot test

The university pilot test was used to ensure that there were no adverse effects on University students’ drinking patterns as a result of watching the video clips in the multimedia resource, and also to reveal any changes that needed to be made before the Year 10 cohort testing took place.

University students in the pilot study completed the pre-test, explored either the traditional or the multimedia resource and completed the post-test. Three months later the pilot cohort completed the follow-up test. Some of the questions asked in the pilot study were different than those asked in the Year 10 study due to development of the tests and resources, age appropriateness and recall of information. There were 17 content related multi-choice questions in the knowledge test from the university pilot test, whereas there were 20 questions in the Year 10 cohort. As this was the pilot study and not the major focus of this research only selected relevant results are presented in this thesis.

The university pilot study consisted of a total of 98 students (some students didn’t answer all demographic questions) of whom 80% were female and 20% were male. Forty-seven participants were from the South Island of New Zealand, 44 from the North Island and three were international students. Fourteen participants self-identified as being of a foreign ethnicity and a similar amount (14%) considered themselves Māori, or at least part Māori.
Figure 4.1: Age of participants in the university pilot study at the time of participation n=94.

The majority of this cohort (59%) self-identified as having “no religion” and over a third of the participants (39%) considered themselves Christian.

Of the 94 students to complete the entry test 16% stated that they do not drink and the majority of participants (66%) do not consider themselves binge drinkers. However, 12% self-identified as binge drinkers and 6% were not sure if they are binge drinkers.

The majority (62%) of this cohort “rarely”, or “never” consume more than five standard drinks in any one occasion. However, 10% of the cohort reported consuming more than five standard drinks in any one occasion. When drinking ‘ready-to-drinks’ (RTDs) 16% of participants indicated that they would consume 6-10 bottles within one occasion, which equates to approximately 12-20 standard drinks (one RTD is usually two standard drinks, alcohol.org.nz). A binge drinking session is defined as five or more standard drinks in one occasion (HPA guideline).

Twenty-three per cent of participants stated that they were 15 years or below when they first felt intoxicated from alcohol. Thirty-one per cent felt intoxicated for the first
time after the legal age of purchasing alcohol. Exposure to either resource did not change the recall age of when participants first felt the effects of alcohol intoxication.

![Figure 4.2:](image)

**Figure 4.2:** Do you think New Zealand has a problem with alcohol use? Comparison between pre and post-tests from the University cohort after exposure to the multimedia resource: a) Multimedia Resource pre-test data, n=94, b) Multimedia Resource post-test, n=46.

After exposure to the multimedia resource, no participants thought that New Zealand did not have a problem with alcohol use. The percentage that answered yes increased from 89% in the pre-test to 94% in the post-test after exposure to the multimedia resource (See Figure 4.2). Of those who received the traditional resource, the same proportion of participants was still unsure after exposure and there was a 2% increase in participants answering no. Those results suggest that the pilot test students who received the multimedia resource could better establish what a binge drinker is than those who received the traditional resource.

When they were under the legal age for purchasing alcohol most participants recall sourcing their alcohol from their parents/legal guardian or from a friend. A total of five participants bought alcohol themselves and three participants sourced alcohol from a member of the community.

Over half of the participants think that the Euphoria stage is the best time to stop drinking. Just over one-third of participants (34%) said that they would stop drinking at
the Euphoria stage the next time that they are drinking. Twenty-eight participants stated that they would not drink the next time they have the opportunity to drink and a similar amount of participants (30%) stated that they would stop drinking at the Impairment stage. There was no effect of different resources on when participants said they would stop drinking the next time they were presented with an opportunity to do so.

Forty per cent students thought that drinking could be dangerous for your brain at Stage two: Impairment of alcohol intoxication, followed by 33% of participants who thought that Stage one: Euphoria could be dangerous for their brains. All 94 of the participants who answered this question agreed that alcohol consumption could have long-term effects on your brain.

Figure 4.3: Bar graph representing information content scores out of 17 questions of the knowledge university pilot test. The x-axis represents the three testing opportunities (pre-test, post-test after resource exposure and follow-up test three months after resource exposure). The y-axis represents the average score for each group out of 17 content related questions. **= P value<0.01 with a Mann-Whitney non-parametric statistical analysis, n= 98, r =0.28, small-medium effect size.
In both the traditional and multimedia resources, participants scored significantly higher in the knowledge test after resource exposure (statistically significant between all tests, \( p < 0.001 \), all large effect sizes, \( r < 0.5 \)) (See Figure 4.3). As these resources were developed to be educational there was an expectation that participants would learn and score higher after exposure of either resource.

The traditional resource scored significantly higher than the multimedia resource after the resource exposure (\( p < 0.01 \), \( r = 0.28 \), small-medium effect size) (See Figure 4.3). An explanation for this unexpected result could reside in the particularity of the university cohort. Indeed, as health science students, the cohort was accustomed to textbook literature and rote learning. A person’s learning style preference is influenced by experience and educational level (Reid, 1987). When this resource is tested on Year 10 there will be a variety of students with different learning preferences and different levels of educational abilities. University pilot participants found both resources useful and no statistical difference was found between how useful participants found either resource.

4.2 Year 10 Background

4.2.1 Year 10 cohort demographics

Nearly half (49%) of the Year 10 cohort self-identified Otago as their home, followed by 28% from Southland. Twelve per cent were from the Hawkes Bay region and nearly four per cent of participants were foreign. Just over 56% of the Year 10 cohort identified as male, 43% as female and one per cent (six students) self-identified as “other” gender. Most of the student cohort was aged 14 or 15 years (See Figure 4.4).

Seventy-one per cent of the Year 10 cohort identified as having no religion and 22% as Christian (Anglican, Catholic, Presbyterian, Methodist, Ratana, Ringatu). Three per cent (17 students) identified as having “other” religion (Buddhist, Hindu, Jehovah’s Witness, Jewish, Mormon, Muslim and Atheist) and the remaining four per cent of students did not provide an answer for their religion.
Table 4.1: Percentage of participants in regards to school, region and socio-economic decile* rating for the Year 10 cohort, n=579.

<table>
<thead>
<tr>
<th>School Region</th>
<th>School</th>
<th>Socio-economic decile rating*</th>
<th>Percentage of data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Southland</td>
<td>Aurora College</td>
<td>2E</td>
<td>5.6%</td>
</tr>
<tr>
<td></td>
<td>James Hargest College</td>
<td>8P</td>
<td>11.1%</td>
</tr>
<tr>
<td></td>
<td>Southland Boys High School</td>
<td>6N</td>
<td>13.5%</td>
</tr>
<tr>
<td>Otago</td>
<td>Taieri College</td>
<td>7O</td>
<td>19.6%</td>
</tr>
<tr>
<td></td>
<td>Bayfield High School</td>
<td>7O</td>
<td>2.3%</td>
</tr>
<tr>
<td></td>
<td>Kings High School</td>
<td>7O</td>
<td>16.6%</td>
</tr>
<tr>
<td></td>
<td>Queens High School</td>
<td>5M</td>
<td>11.0%</td>
</tr>
<tr>
<td></td>
<td>St Hilda's Collegiate</td>
<td>10</td>
<td>5.3%</td>
</tr>
<tr>
<td>Hawkes Bay</td>
<td>Tamatea High School</td>
<td>3H</td>
<td>5.3%</td>
</tr>
<tr>
<td></td>
<td>Flaxmere College</td>
<td>1</td>
<td>9.8%</td>
</tr>
</tbody>
</table>

* Decile ratings are a score generated by the Ministry of Education. This number is calculated from information provided from the census and takes surrounding school homes’ income, job and income beneficiaries into consideration.

Figure 4.4: A pie graph representing the ages of the Year 10 student cohort that participated in the study, n= 579 students.
4.2.2 Drinking Patterns and Perceptions

The majority of the habitual drinking patterns questions were asked in the pre-test of the study, before students had been exposed to either resource.

Figure 4.5: A bar graph representing the self-identified ethnicity of the Year 10 student cohort, \( n = 579 \) students. Note category "other" is an amalgamation of the ethnicities where there was just one student who chose that ethnicity option. Note more than one option could be chosen, therefore total percentage adds to more than 100.

Figure 4.6: Wordcloud representation of words provided by Year 10 students used to describe alcohol, before exposure to either resource, \( n = 579 \).
Over half (53.5%) of the Year 10 students said that they have drunk alcohol (more than a few sips), 3.7% were not sure and the remaining (42.8%) reported never having drunk alcohol. Fifteen per cent of the Year 10 cohort recalled their first feelings of intoxication at the age of 13 years and 21% of the cohort were 12 years or below (See Figure 4.8).

The average self-reported age of the students’ first drink (not including a few sips) was 12.6 years. The actual average may be even lower than this, as the lowest option for this question was nine or under, which was then computed as nine years to calculate the average (4.5% chose nine years or under). This is an interesting finding that differs from a previous study. Kypri and colleagues (2009) found that the average age for first drink in New Zealand was 14.6 years. Kypri and colleagues asked University students many years after their first drink, whereas in this study, I asked at a Year 10 level which may provide a more accurate estimation of age of first drink.
Figure 4.8: The pie graph represents the age of which students recall the first time they had a drink (not including a few sips), $n=579$.

Ten per cent of Year 10 participants reported having drunk once in the last four weeks. Thirteen per cent stated that they had drunk alcohol on a regular basis in the last four weeks, and of that group, four students from the Hawkes Bay area reported that they drink alcohol most days (See Figure 4.9). When asked specifically how many times students consumed more than five standard drinks in one occasion over the last four weeks, 11% recognised that they had binged once in the last four weeks and 9% binged on a regular basis of more than two-three times in the last four weeks.

Year 10 students were then asked how many standard drinks they think they would usually consume if they did drink and 13% noted they would drink five or more standard drinks if they were to consume alcohol. For an adult 18 years or over, five or more standard drinks in one occasion is considered a binge drinking session (advised by alcohol.org.nz, HPA recommendation). There is no safe recommendation of alcohol intake for those aged below 18 years of age.
Figure 4.9: The pie graph represents how often Year 10 students have drunk alcohol in the last four weeks, $n=579$.

Figure 4.10: The pie graph represents how many standard drinks Year 10 students drink in one drinking session, $n=579$. 
Figure 4.11: Bar graph representing the types of alcohol that students drink. \( n = 579 \). Note RTDs (Ready to Drink). Students could choose more than one option, therefore total percentage adds to more than 100.
Figure 4.12: Bar graph representing the reasons why Year 10 students drink alcohol. Students could choose more than one option, $n=579$. Students could choose more than one option, therefore total percentage adds to more than 100.
Figure 4.13: Bar graph representing how Year 10 students source their alcohol. The bars coloured in red represent sources of alcohol that do not involve parents’ permission. Students could choose more than one option, therefore total percentage adds to more than 100, n= 579.

Two year 10 students claimed that they buy their own alcohol illegally. Five per cent of students said that their friend’s parents buy their alcohol for them. Eight per cent students said that they get another adult to buy the alcohol for them. From Figure 4.13 it is clear that a large proportion of the Year 10 cohort are potentially drinking without their parent’s knowledge (bars coloured red) and are sourcing alcohol illegally.
Do Year 10s consider themselves binge drinkers?

**Figure 4.14**: Pie graphs representing student responses to if they consider themselves binge drinkers before and after exposure to the traditional and the multimedia resource. Cochran Test followed by McNemar Test. Multimedia resource: Statistically significant difference between pre-test and post-test (p value< 0.05). Statistically significant difference between pre-test and follow-up test (p value< 0.05), n=298. Traditional resource: Statistically significant difference between pre-test and post-test (p value< 0.05). Statistically significant difference between pre-test and follow-up test (p value< 0.05), n=293.
When Year 10 students were asked if they were worried about how much alcohol they drank, there was a significant increase amongst students who received the multimedia resource in those who answered yes between the pre-test (0.7%) and the post-test (3.8%) (McNemar test, p value< 0.01, n=282). Of the students who received the traditional resource, there was no significant change in the number of students who were worried about their drinking.

When asked if they thought that New Zealand had a problem with alcohol use, students who received the multimedia resource reported “yes” significantly more in the post-test than pre-test (Wilcoxon Signed Ranks test, p value< 0.001, effect size (r)=0.44, medium effect size). This difference for the multimedia group was also significant in the follow-up test compared to the pre-test (Wilcoxon Signed Ranks test, p value< 0.001, n=293, effect size (r)=0.32, medium effect size). There was no difference in answers at different times for those who received the traditional resource.

Year 10 students were asked to choose at which of the five stages of alcohol intoxication they thought that drinking could be dangerous for their brains. Those who received the multimedia resource chose a lower point of intoxication after resource exposure (average score pre-test 3.03, post-test 2.72, statistically significant, Wilcoxon Signed Ranks test, p value< 0.05, n= 228, effect size= 0.145, small effect size). There was no significant change in the answers from those who received the traditional resource. Although the average score in the pre-test of the traditional resource was 2.78, lower than the pre-test of the multimedia resource.
Figure 4.15: Where Year 10 students would seek help concerning alcohol, \( n = 579 \). Note, each participant could choose more than one option, therefore total percentage adds to more than 100.

Figure 4.15 shows that the majority of students (\( n = 401 \)) would consider turning to their parents for help concerning alcohol while nine per cent of students said that they wouldn’t look for help concerning alcohol. Interestingly, nearly half of the students said they would seek help from the school guidance counsellor, just as much as friends or drug and alcohol services. These findings accentuate the important role of student counsellors in schools and the support they provide to adolescents.
4.3 Year 10 Resource Comparison

4.3.1 Knowledge test of resources

The questions in the 20 multi-choice knowledge test were the same for the pre, post and follow-up tests for both resources.

**Figure 4.16:** Information content scores out of 20 questions for the Year 10 cohort tests. The pre-test, was taken immediately before exposure to the resource, the post-test immediately after resource exposure and follow-up test 3-6 weeks after resource exposure. The average score for each group was the sum of correct answers to 20 content related questions. * = p value < 0.05 with a Mann-Whitney U test. Effect size: Cohen’s $d = -0.16$, effect-size $r = -0.09 = \text{small effect size}, n = 550$.

For both resources there was a significant difference between all three tests (Wilcoxon Signed-Ranks test). Both groups performed significantly better after exposure to either resource in the post-test and the follow-up test three-six weeks later ($p < 0.001$) (See Table 4.2 for effect sizes).
Table 4.2: Effect size (r) of resources between testing (pre, post and follow-up tests).

<table>
<thead>
<tr>
<th></th>
<th>Effect size difference between pre-test and post-test.</th>
<th>Effect size difference between pre-test and follow-up test.</th>
<th>Effect size difference between post-test and follow-up test.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Resource</td>
<td>$r = 0.79$, large effect size</td>
<td>$r = 0.69$, large effect size</td>
<td>$r = 0.49$, medium-large effect size</td>
</tr>
<tr>
<td>Multimedia Resource</td>
<td>$r = 0.83$, large effect size</td>
<td>$r = 0.70$, large effect size</td>
<td>$r = 0.62$, large effect size</td>
</tr>
</tbody>
</table>

When comparing resources, the group exposed to the multimedia resource performed significantly better in the post-test of the 20 multi-choice knowledge test than those who received the traditional resource ($p<0.05$, effect size = 0.09, small effect size, Mann-Whitney U test) (See Figure 4.16). There was no significant difference found between the resources in the follow-up tests three to six weeks later. This could be due to a number of reasons explained below.

While I was present in the classroom during the pre-test, resource exposure and the post-test I was not present for the follow-up test three to six weeks later. I cannot assure that the testing conditions were the same, or know how long the students spent fully focused on the follow-up test. The number of students who completed the follow up test and the degree to which students paid attention to the test may have been dependent on their teacher’s motivation to complete the task.

Originally the plan was to perform the follow-up tests three months after resource exposure (as done in the university pilot test). Due to delay in ethics approval this time frame had to be shortened to three to six weeks to fit within the school term. If the Year 10 students were tested again after three months, there may have been a difference between resources regarding retention of information.

The small or lack of difference between learning from the two resources may be due to redundancy effect of over-stimulating the sensory pathways and causing the split-attention hypothesis (Mayer & Moreno, 1998). As I was not aware of this theory before
producing the resource, there are many instances throughout the multimedia resource where there are both visual words and oral narration at the same time. This may have inadvertently inhibited some students’ learning and as a result impacted their scores.

Lastly, there was some information that was presented only through text in the multimedia resource. As most students who were using this resource were watching the video clips and skipping the text, they may have missed this important information. Those who received the traditional resource were more likely to read this information. For example, a larger proportion of students answered the questions correctly regarding content of “tips on your drinking” than those who had the multimedia resource. This section was presented as text only at the conclusion of the resource and did not provide any multimedia variation in the delivery (See Table 4.3).

<table>
<thead>
<tr>
<th>Table 4.3: Comparison between resources of the percentage of students who correctly answered the questions regarding content of “Tips on your drinking” section.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q: The toilet test is where you can? A: Analyse your intoxication symptoms.</td>
</tr>
<tr>
<td>Q: When you feel intoxicated you should? A: Swap to water.</td>
</tr>
<tr>
<td>Q: What should you do if you feel like you’re not in control when drinking alcohol? A: Find/ring some one you can trust to organise a safe way home.</td>
</tr>
</tbody>
</table>
4.3.2 Resource preferences

An understanding of the resource preferences of the Year 10 students was gained from the open-ended responses that were thematically analysed and coded.

a) 

![Pie chart showing the proportion of students who liked or disliked the traditional resource.](image1)

b) 

![Pie chart showing the proportion of students who liked or disliked the multimedia resource.](image2)

**Figure 4.17:** A comparison of the students’ preferences for the traditional (a) and multimedia resource (b). Data sourced by themed content analysis of open-ended question, n=579.
Figure 4.17 shows that a larger proportion of students who received the multimedia resource reported liking the resource in comparison those who had received the traditional resource. The multimedia resource also resulted in fewer students reporting that they disliked the resource or the delivery method. From comparing these graphs (See Figure 4.17) we can see that more students using the multimedia resource failed to answer the open-ended question of what they liked and disliked about the resource. If they thought the resource was "fine" and neither liked nor disliked the resource they may had less motivation to provide an answer. There was the same number of inconclusive answers in feedback for both resources.

| Table 4.4: Students organised the multimedia components into their most and least preferred delivery methods. The table shows the top three most and least preferred delivery methods of the multimedia resource, n=284. |
| Most preferred multimedia Component | Least preferred multimedia component |
| Watching video clips | Reading text | 81% | 47% |
| Teri’s story | Listening to podcast narration | 59% | 36% |
| Watching journal clips | Photography galleries | 57% | 30% |

Options: Reading the text, Animations, Listening to the narration, Brain photos and diagrams, Photography galleries, Teri’s story, Watching journal clips, watching video clips, Teri presenting the facts, Music soundtrack. Note: this question was only asked in the multimedia resource, as the traditional resource only has text and photographic diagrams.

Students were also asked which multimedia components they used the most and which they used the least. However, due to technical difficulties some options were missed and therefore those data are not comparable to Table 4.4 and are thus not included in this report.

Table 4.5 shows examples of the thematic analysis of open-ended question of what students’ liked and disliked about the resource. The reoccurring themes were students evaluating the informational content of the resources, the delivery of this content and the overall evaluation of the resources. Note that not all students enjoyed the resource, or its delivery (See Appendix IV for more examples). Comments on future behavioural intentions were also recorded. Future drinking intentions are discussed in the next section.
Table 4.5: Examples of open-ended question answers organised into themed responses (one example per theme from each resource group). See Appendix IV for other examples.

<table>
<thead>
<tr>
<th>Theme</th>
<th>Resource</th>
<th>Student response example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content Evaluation</td>
<td>Traditional</td>
<td>I think it was great. It's good knowing what could happen if you go to over board with drinking alcohol and how dangerous it can really be. It's very educational and I thoroughly enjoyed finding out all this information.</td>
</tr>
<tr>
<td></td>
<td>Multimedia</td>
<td>I thought it was good, and that it's important that teens know about some of the ill effects/consequences of binge drinking before they're absorbed into that culture.</td>
</tr>
<tr>
<td>Delivery of Content</td>
<td>Traditional</td>
<td>It was okay I guess, I liked that there was a questionnaire before and after and I disliked the reading, as I don't pick up information well from written words. I find it easier when learned from another person or by a resource e.g. Documentary.</td>
</tr>
<tr>
<td></td>
<td>Multimedia</td>
<td>I really liked watching the video clips and the story, it really helped explain the information and then having the text if I missed a bit or wanted to read a fact to help remember it. I liked having the different ways of learning the information so you could choose what you preferred.</td>
</tr>
<tr>
<td>Resource Evaluation</td>
<td>Traditional</td>
<td>I thought it was interesting. I liked it because I learnt something from it and saw my own differences in the answers from my first test and the last one. I disliked it because it was a bit boring just reading because information that I read didn't really sink in.</td>
</tr>
<tr>
<td></td>
<td>Multimedia</td>
<td>I think that this resource is very informative and helpful. The videos and audio tracks are a good touch, they kept me focused and engaged. All the questions were good and appropriate for people my age. This survey should be released around New Zealand.</td>
</tr>
</tbody>
</table>

4.3.3 Future drinking Intentions

This section shows examples of responses that mentioned an aspect of future drinking intentions when students were asked to describe what they liked and did not like about the resource. Table 4.6 includes responses from those who had been exposed to the traditional resource; Table 4.7 includes responses from those exposed to the multimedia resource.
Table 4.6: Examples of future behavioural intentions from students who were exposed to the traditional resource. See Appendix IV for other examples.

Quite a lot to read but it was very informative and helpful. I will definitely not be drinking much alcohol until I'm 18 or until my brain is fully developed.

I think this resource was very useful on alcohol. I have learnt a lot of helpful info for when I am older. If I do drink I will know how much and how often to do so.

This resource made me never want to consume alcohol, because of the effects that can harm and damage our brain.

I liked the information given, because it will be helpful if I do drink in the future, to know what's going on my brain, and it will make me safer in dangerous situations.

I liked this resource because it gave us a better insight on how alcohol impacts our brain, and that it holds long term effects and can seriously damage our systems. I feel like I know more about alcohol usage, and if there is a time where I do drink, I'll know how to handle it.

I think this is a good resource for informing people of the very negative affects of alcohol on the brain. It is all very clearly laid out and is easy to understand. This will all be taken into consideration IF I ever go to drink alcohol, or if anyone around me is considering it.

I like this resource very much because I learnt a lot about alcohol and that I should be very smart around alcohol and it makes me think about my future and what alcohol can do to me and what it can do to change in my life. Thank you :)

Table 4.7: Examples of future behavioural intentions from students who were exposed to the multimedia resource. See Appendix IV for other examples.

I found it useful how there was different options to get the information, I learnt a lot about alcohol consumption and the effects on the brain. I now know that when I am older and if I drink what is dangerous for my brain and what is putting my life at risk.

I liked how Teri has presented the whole website it is a good way to show how drinking is very bad for kids and how we teenagers should not be drinking at such a young age it could prevent something bad this site has taught [sic] me a lot Thanks.

This resource is very useful and it shows what actually happens when you drink too much. I feel more informed of the dangers of alcohol and will be very cautious and careful when I decide to start drinking.

I like the fact that it follows a general storyline of what mainly happens in NZ when you are at university and just warns us of what may come if we drink too much.

It was pretty good but I still don’t think it’s enough to make me stop, as it does become more of a need then want.

I liked it cause it was helpful about teaching me the affects of alcohol when drunk, it may slow down my drinking if I do in the future.

I really liked the info that this resource has shown me and I will take it all in and maybe consider slowing down or finding something instead of drinking ;}
In the follow-up testing, students were asked if their drinking had changed in the last four weeks. There was no statistically significant difference between those who answered “yes” to this question (traditional resource= 8.1%, multimedia resource= 8.9%). If students answered that their drinking had changed, they were then asked to explain why. Some students did not explain why their drinking habits had changed, and some did not give detail of if their drinking had either decreased or increased in the last four weeks. Therefore I was unable to infer if their drinking had decreased or increased in the last four weeks, after exposure to the resource interventions.

Tables 4.8 and 4.9 show examples of responses in the follow up tests three to six weeks after resource exposure.

<table>
<thead>
<tr>
<th>Table 4.8: Examples of follow-up responses from Year 10 students three to six weeks after seeing the traditional resource. See Appendix IV for other examples.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I liked the resource. I found it very interesting. I don't remember much of the actual facts anymore.</td>
</tr>
<tr>
<td>A bit boring but okay I still have the knowledge and remember some parts and not others.</td>
</tr>
<tr>
<td>It was well written but I can't recall a lot of information.</td>
</tr>
<tr>
<td>I really wanted to watch the videos because they looked interesting and I can't really remember anything now.</td>
</tr>
<tr>
<td>I can't remember any of the information that we learnt because when we read it I was bored and skim read it.</td>
</tr>
<tr>
<td>I liked it. My group didn't have videos though which made it hard to remember so much information.</td>
</tr>
<tr>
<td>It was okay but all of the information was a bit big and hard to take in and it's hard to remember the stuff you learn. If it was easier to remember and the words were explained a bit better it may have been better.</td>
</tr>
<tr>
<td>It was good and very informative but it was hard to remember everything.</td>
</tr>
<tr>
<td>It was fine. It made me think about my future reference and whether or not I should be concerned about my drinking and I certainly am now! Thanks.</td>
</tr>
<tr>
<td>I liked the test because of all the different questions, although I couldn't remember some of the answers from last time and I had to guess.</td>
</tr>
</tbody>
</table>

MScicomm 91
Table 4.9: Examples of follow-up responses from Year 10 students three to six weeks after seeing the multimedia resource. See Appendix IV for other examples.

<table>
<thead>
<tr>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>It’s pretty good because it asks you full personal questions and makes you actually think about how much your drinking and starts to think how it actually affects you.</td>
</tr>
<tr>
<td>I think that if we had to do this test you should make the year ten’s next year do it. :)</td>
</tr>
<tr>
<td>It was helpful but the follow up test was too far away from the first test so we couldn’t really remember much stuff.</td>
</tr>
<tr>
<td>I really like it. It needs to go national.</td>
</tr>
<tr>
<td>The way it was set out is good, but I personally found there was a very long time between the test and post-test.</td>
</tr>
<tr>
<td>The videos were good because I actually paid attention, but I forgot the things about the brain.</td>
</tr>
<tr>
<td>This questionnaire is quite long and we have to do it 3 times, which is annoying. The whole resource was very useful though.</td>
</tr>
<tr>
<td>I think it was good because there was a clip in my head that could be easily remembered.</td>
</tr>
</tbody>
</table>

4.2.4 Resource comparison summary

Year 10 students who viewed either resource scored significantly higher (large effect size) after exposure and retained information from both resources. When comparing resources, students who receive the multimedia resource performed significantly better (small effect size). There was no significant difference found in the retention of information between resources. Of the students who received the multimedia resource, more liked the resource, and fewer disliked the resource, or its delivery in comparison to those who received the traditional resource. However there were also a larger proportion of students in the multimedia group that did not answer this question (27% multimedia compared to 11% traditional). The most preferred components of the multimedia resource were video clips, audio of Teri’s story and journal clips. The least preferred components were the written text, podcasts and photo galleries.
4.4 Year 10 Cross analysis

4.4.1 Social economics and ethnicity analysis

A cross analysis was conducted of results with the socio-economic decile ratings and the Māori/Paciﬁka populations. Decile ratings are a score generated by the Ministry of Education. It should be noted that the decile number is not a representation of the school’s achievement level, academic or otherwise. As the Hastings region had only two schools tested that had a socio-economic decile rating of one and three, there was no further region-based analysis. For the purpose and the sample size (n=571), the socio-economic decile numbers were allocated into the groups A, B, C or D, based on the schools socio-economic decile number (See Table 4.10).

<table>
<thead>
<tr>
<th>Allocated Group for analysis</th>
<th>n=</th>
<th>Socio-economic decile range</th>
<th>School</th>
<th>Percentage of students in study</th>
<th>Percentage of Māori/ Paciﬁka students per decile group</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93</td>
<td>10 8</td>
<td>St Hilda’s Collegiate James Hargest College</td>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>B</td>
<td>220</td>
<td>7 7 7</td>
<td>Taieri College Bayfield High School Kings High School</td>
<td>38</td>
<td>13</td>
</tr>
<tr>
<td>C</td>
<td>140</td>
<td>6 5</td>
<td>Southland Boys High School Queens High School</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>D</td>
<td>118</td>
<td>3 2 1</td>
<td>Flaxmere College Aurora College Tamatea High School</td>
<td>20</td>
<td>60</td>
</tr>
<tr>
<td>Total:</td>
<td>571</td>
<td>n/a</td>
<td>10 Schools in total</td>
<td>100</td>
<td>n/a</td>
</tr>
</tbody>
</table>

Table 4.10 shows that schools in decile group D contained a much higher percentage (60%) of Māori or Paciﬁka Island students than any other decile group. Although it is important to note that two out of the three schools in decile group D were based in the North Island of New Zealand (the only two schools from the North Island that were
included in this study). The Ministry of Health (2007) identifies Māori and Pacific Islander students as groups of high-risk to alcohol-related harm, warranting further analysis of data from decile group D.

<table>
<thead>
<tr>
<th>Socio-economic decile group</th>
<th>Percentage of students who have drunk alcohol (out of total number of participants)</th>
<th>Percentage of students who have drunk alcohol (% per decile group)</th>
<th>Average age of first drink</th>
<th>Percentage of binge drinkers (pre-test data)</th>
<th>Percentage of those who reported having 5+ standards per occasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>A n=93</td>
<td>5</td>
<td>32</td>
<td>12.6</td>
<td>3.1</td>
<td>6.5</td>
</tr>
<tr>
<td>B n=220</td>
<td>20</td>
<td>51</td>
<td>12.8</td>
<td>0.9</td>
<td>8.2</td>
</tr>
<tr>
<td>C n=140</td>
<td>16</td>
<td>64</td>
<td>12.7</td>
<td>2.1</td>
<td>11.4</td>
</tr>
<tr>
<td>D n=118</td>
<td>12</td>
<td>59</td>
<td>12.2</td>
<td>5.0</td>
<td>29.7</td>
</tr>
</tbody>
</table>

Table 4.11: Drinking patterns of participants from different socio-economic decile groups n=571. Group A was the highest socio-economic decile; D was lowest. Note: the minimum age option was 'nine years or below' in question about age of first drink.

Table 4.11 shows that about 30% of students in decile group D reported drinking five or more drinks every time that they drink. The average age for first drink is the same for all decile groups. Table 4.12 shows that 5.9% of students in decile group D have binged (five or more standard drinks on any occasion) every week in the last four weeks. Also 4.7% of Māori/Pacifika students have binged every week in the last four weeks. As there are a high proportion of Māori/Pacifika students in the allocated decile group D and these binge drinking/per week statistics are similar for both groups there may be a relationship between the Māori/Pacifika students in allocated decile group D and their habitual drinking patterns. Further work that investigates the specific details of this trend may be warranted.
Table 4.12: In the past four weeks how many times respondents in different socio-economic decile groups report having five or more standard drinks in any one session. (Socio-economic group A is highest; D is lowest.) Percentages are based per allocated socio-economic decile group. Total $n$ of students = 571.

<table>
<thead>
<tr>
<th>Decile Group</th>
<th>Once in the past 4 weeks (%)</th>
<th>Two or three times in the past 4 weeks (%)</th>
<th>Every week (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ($n=93$)</td>
<td>4.3</td>
<td>3.2</td>
<td>0</td>
</tr>
<tr>
<td>B ($n=220$)</td>
<td>10.9</td>
<td>5</td>
<td>0.9</td>
</tr>
<tr>
<td>C ($n=140$)</td>
<td>9.3</td>
<td>7.9</td>
<td>0</td>
</tr>
<tr>
<td>D ($n=118$)</td>
<td>21.2</td>
<td>11</td>
<td>5.9</td>
</tr>
<tr>
<td>Māori/Pacifica (% of Māori/Pacifica Students in all decile groups)</td>
<td>17.3</td>
<td>9.3</td>
<td>4.7</td>
</tr>
</tbody>
</table>

Table 4.13: Māori/Pacific Island ethnic students and habitual drinking patterns of participants $n=571$. Note: minimum age option nine years or below for choice of age of first drink.

<table>
<thead>
<tr>
<th>Allocated socio-economic decile group for analysis</th>
<th>Percentage of Māori/Pacifica students who have drunk alcohol</th>
<th>Average age of Māori/Pacifica student’s first drink</th>
<th>Percentage of Maori/Pacifica students per who have 5+ standards per occasion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Māori/Pacifica percentage</td>
<td>60.7</td>
<td>12.6</td>
<td>22</td>
</tr>
</tbody>
</table>

Tables 4.12 and 4.13 further support that the Māori/Pacifica student population have similar habitual drinking patterns to the allocated decile group D. Therefore more work is required to uncover why decile group D and Māori/Pacifica student habitual drinking patterns are similar. I examined how these decile groups and Māori/Pacifica students scored in the knowledge tests to identify whether one resource may better suited to certain socio-economic groups or ethnicities.
4.4.2 Social economic influence on effect and preference

Student performance with each resource and what resource they preferred was different in the different socio-economic decile groups.

<table>
<thead>
<tr>
<th>Socio-economic decile group</th>
<th>Pre-test</th>
<th>Post test</th>
<th>Follow-up test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trad</td>
<td>MM</td>
<td>Trad</td>
</tr>
<tr>
<td>A</td>
<td>9.38 n=45</td>
<td>10.00 n=45</td>
<td>14.42 n=50</td>
</tr>
<tr>
<td></td>
<td>NS</td>
<td></td>
<td>p&lt;0.001 r=0.3641, medium effect Cohen’s d= 0.782</td>
</tr>
<tr>
<td>B</td>
<td>9.39 n=102</td>
<td>9.03 n=111</td>
<td>14.08 n=106</td>
</tr>
<tr>
<td></td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>C</td>
<td>8.66 n=45</td>
<td>9.18 n=60</td>
<td>12.57 n=65</td>
</tr>
<tr>
<td></td>
<td>NS</td>
<td></td>
<td>p&lt;0.01 r=0.2377, small effect Cohen’s d= 0.4895</td>
</tr>
<tr>
<td>D</td>
<td>8.42 n=48</td>
<td>7.51 n=61</td>
<td>11.69 n=48</td>
</tr>
<tr>
<td></td>
<td>NS</td>
<td>NS</td>
<td>p&lt;0.05 r=0.244, small-medium effect Cohen’s d= 0.503</td>
</tr>
</tbody>
</table>

As students in decile group D were perceived to be less focused in the classroom and less studious than decile group A I had predicted that students in decile group D would perform better with the multimedia resource than with the traditional resource. Table 4.14 and Figure 4.18 demonstrate that the opposite results were found. A comparison of students in decile groups A and D will be the focus for the remainder of this discussion because the largest differences in scores and habitual drinking were found between these groups.

Pre-test scores from decile group A and D were compared using Mann-Whitney U tests to see if there was a significant difference in the starting point knowledge of both decile groups. The average starting score for decile group A was 9.69, significantly higher (P<
than the starting knowledge point from decile group D (7.96). This was a small effect size ($r=0.28$). Therefore, decile group D should not be expected to reach the same level of scoring than decile group A.

Table 4.14 shows that students in decile group A performed significantly better with the multimedia resource in both the post-test and the follow-up test in comparison to the traditional resource. Table 4.14 also shows that for students in decile group D the opposite is true. Students in decile group D performed significantly better with the traditional resource, contrary to my expectation.

**Figure 4.18:** Distribution of pre, post and follow-up test scores for the knowledge tests of students in decile groups A and D who received the traditional or multimedia resources.

<table>
<thead>
<tr>
<th></th>
<th>Difference (%) between pre and post test score</th>
<th>Difference (%) between post and follow-up test score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A Traditional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$n = 52$</td>
<td>+25.6</td>
<td>-9.0</td>
</tr>
<tr>
<td><strong>Group D Traditional</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$n = 57$</td>
<td>+16.4</td>
<td>-1.6</td>
</tr>
<tr>
<td><strong>Group A Multimedia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$n = 46$</td>
<td>+31.1</td>
<td>-8.8</td>
</tr>
<tr>
<td><strong>Group D Multimedia</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$n = 63$</td>
<td>+20.2</td>
<td>-11.2</td>
</tr>
</tbody>
</table>
Students in schools in decile group A excelled with the multimedia resource over those in the other decile groups. Students in decile group D did better with the traditional resource and the level of recall of information was highest with this resource in comparison to other decile groups. The starting knowledge point for students in decile group D was lower than those in decile group A. This contrasts with findings from Issa, Cox and Killingsworth (1999) that higher scoring students in high schools and a university setting showed little difference in performance between multimedia and traditional resources while low scoring students performed dramatically better with a multimedia resource. Interestingly also, after exposure to the traditional resource the knowledge gap between these decile-rated schools were insignificant three to six weeks later.

The retention of knowledge (as measured by percentage difference in score between the post-test and the follow-up test) appears to be smaller for decile group D in the traditional resource than the other groups.

Table 4.16 shows that scores on the post-test for students in decile group A were significantly higher after exposure to either resource than scores of students in decile group D.

| Table 4.16: Statistical analysis of the post-test score from decile group A and D to see if there is a significant difference in the post-test scores of both decile groups. Mann-Whitney U tests. |
|-------------------------------|-----------------|-----------------|-----------------|
|                               | Post-test score | Statistical     | Effect size     |
|                               | Average         | Significance     |                 |
| Traditional Resource         |                 |                 |                 |
| Group A n = 50               | 14.42           | P value < 0.01  | r = 0.315,      |
|                               |                 |                 | medium effect   |
| Group D n = 48               | 11.69           |                 |                 |
| Multimedia Resource          |                 |                 |                 |
| Group A n = 46               | 16.22           | P value < 0.001 | r = 0.539,      |
|                               |                 |                 | large effect    |
| Group D n = 59               | 11.54           |                 |                 |
Table 4.17: Statistical analysis of the follow-up score from Decile group A and D to see if there is a significant difference in the follow-up scores of decile groups. Mann-Whitney U tests.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Group</th>
<th>Average</th>
<th>Statistical Significance</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional</td>
<td>Group A</td>
<td>12.62</td>
<td>NS</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Group D</td>
<td>11.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multimedia</td>
<td>Group A</td>
<td>14.45</td>
<td>P value&lt; 0.001</td>
<td>r =0.557, large effect</td>
</tr>
<tr>
<td></td>
<td>Group D</td>
<td>9.30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Although decile groups A and D started out with significantly different knowledge and both decile groups scored significantly higher after exposure to either resource, Table 4.16 shows that there was no significant difference in the knowledge in the follow-up test for students who received the traditional resource (Table 4.17).

Figure 4.20 shows the preferences between resources of students in decile groups A and D. Students in group A who received the multimedia resource liked the resource more than those who received the traditional resource, which was reflected in their knowledge scores as previously mentioned. However, from this figure we can also see that resource preference for group D reflects their scores in the knowledge test for the post-test, but not the follow-up test. Although there was no major difference between preferences within group D, students performed better longer-term with the traditional resource. It is interesting to note how many students did not answer this open-ended question in decile group D, especially those who received the multimedia resource (30%).
Decile Group A and D Student Resource Preferences

Traditional A

Multimedia A

Traditional D

Multimedia D

Figure 4.19: Differences in resource preferences between students in decile groups A and D. Data represent thematic analysis of open-ended question.
Even though there are a high number of Māori/Pacifika students in the allocated decile group D, there were no significant differences between resource performances (See Table 4.18). Therefore the differences found cannot be explained by ethnicity, despite decile group D having a high proportion of Māori/Pacific Island students. There were also no statistically significant differences found between gender, nor students with religious differences.

4.3.3 Cross analysis summary

Within this study, lower socio-economic rated schools tended to have a higher proportion of Māori/Pacifika students (60%), compared to 17% in the highest rated socio-economic decile-rated schools. Students in lower-rated decile schools reported higher levels of binge drinking in comparison to other decile groups. More specifically, five per cent report to being binge drinkers before resource exposure, 30% of all students in decile group D report having five or more standard drinks every time they drink, and 6% binged every week of the last four weeks. Habitual drinking patterns of Māori/Pacifika students are statistically similar to those found in other students in the lower rated decile group D.

Students in the highest-rated decile group A scored significantly higher in the post and follow-up test after using the multimedia resource. These students also reported a higher preference for the multimedia resource compared to the traditional resource. Therefore, the findings from decile group A support all three hypotheses of this study: that preference, understanding and retention of information is greater with multimedia resources in comparison to traditional style resources.
The lower-rated decile group D did not show performance differences between resources immediately after exposure, but those who received the traditional resource did have a significantly higher average knowledge score in the follow-up test. It was found that students in decile group A started with a significant knowledge advantage over those in decile group D. Interestingly, the students who received the traditional resource in decile group D showed the least drop in recall of information in the follow-up test, compared to all groups in both resources. It appears that decile group D performed significantly well with the traditional resource and had a very high level of recall after using this resource. The knowledge advantage of group A over group D was insignificant after the follow-up test of those students who received the traditional resource.

Regarding resource preferences between in the lower decile group D, there were more students who disliked the traditional resource, however there was nearly twice the amount of students who did not answer the open-ended question in the multimedia resource (30%). Even though drinking patterns between Māori/Pacific students and those in decile group D are very similar there was no relationship found between Māori/Pacific students and performance of either resource. This suggests that the differences of resource performance found in decile group D cannot be explained by ethnicity.
5. General discussion

5.1 Resource novelty

The results show that students in the higher socio-economic decile-rated schools performed better on tests of knowledge after having been exposed to the multimedia resource both immediately after and three to six weeks after resource exposure. Students from the higher socio-economic decile-rated schools may be more accustomed to multimedia resources as they may have access to more of this type of resource in comparison to those in lower socio-economic decile-rated schools. If the higher socio-economic decile-rated schools are more accustomed to multimedia resources they may be normalized to using these sorts of resources, and have learned how to extract relevant information whilst not becoming distracted by the multimedia components. Alternatively, students from the higher socio-economic decile-rated schools may have seen the multimedia resource as a novelty and therefore found it more interesting and/or engaging than traditional resources that they usually get in classes, resulting in better performance. Novelty has been noted as one of 11 key motivator elements for engagement with multimedia resources (Liu, Toprac & Yuen, 2009).

It would be interesting to evaluate how many teaching resources are of a multimedia delivery in each socio-economic decile-rated school, although this is beyond the scope of this study and warrants further investigation.

5.2 Normalisation of alcohol-related harm

According to Statistics New Zealand (Ministry of Health, New Zealand Health Survey, 2014) 38% of Māori and 35% of Pacific Island New Zealanders 15 years and over had participated in potentially hazardous drinking in the past year. This is much higher than the total national 20% of all New Zealanders and demonstrates that Māori/Pacifika are a high-risk group for hazardous drinking. Having Māori respondents in a household, living in high deprivation area and a low economic standard of living are all considered to be risk factors related to poor child outcomes as identified by the Ministry of Health (Statistics New Zealand, 2014).
In this study 60% of the students in the lowest socio-economic decile-rated schools were Māori/Pacifika. It may be that these students, even if not drinking themselves, are more likely to witness hazardous alcohol-related behaviour at home. If these students are witnessing more hazardous drinking at home than students in higher rated socio-economic decile-rated schools, then these Māori/Pacifika students may be normalised to hazardous drinking and therefore not identify the hazardous and dangerous nature of habitual harmful drinking patterns. This may at least partially explain the lower starting knowledge of students in the lower socio-economic decile-rated schools in this study.

The reduced effectiveness of the multimedia resource on the lower rated socio-economic decile-rated schools was a surprising result. There is a range of possible explanations. It could be that Māori/Pacifika students who are already exposed to hazardous drinking behaviour at home showed normalisation of alcohol-related harm and were not shocked or even startled by the videos contained in the multimedia resource. As the results demonstrate, students in these lower socio-economic decile-rated schools achieved higher learning scores with use of the traditional resource where there were no visual or character examples of hazardous drinking, just the scientific facts of intoxication. This is in spite of the deliberate selection in the multimedia resource of a flat with actors that included Maori/Pacifika.

5.3 Learning styles in socio-economic decile schools

Mayer (1997, 2001) developed a model of the cognitive theory of multimedia learning whereby the multimedia presentation, the sensory memory and working memory work via separate pathways (a visual-processing channel and an auditory processing channel) and integrate new information with prior knowledge to maximize multimedia learning (See Figure 5.1). Another of Mayer’s hypotheses concerning the cognitive theory of multimedia learning is that the visual-processing channel can be overloaded, causing students to split their visual attention between two sources; he has called this the redundancy effect in multimedia learning (Mayer & Moreno, 1998). This is where the
inclusion of redundant text on screen may compete with an animation for visual attention. College students who watched an animation performed worse regarding retention and transfer of information than students who received no visual on-screen text, but instead received the same animations with oral narration (Mayer et al., 2001). In Mayer's study, students also had lower transfer of information when interesting, but irrelevant details were added to the narration, or conceptually irrelevant video clips were inserted within or before the presentation (Mayer et al., 2001).

Figure 5.1: Mayer's (2001) generative multimedia learning model from Mayer's (1998) cognitive theory of multimedia generative model. Multimedia learning: Are we asking the right questions? This model depicts both the auditory and visual processing pathways and integration of information through multimedia learning.

Students in the lower socio-economic decile-rated schools started with significantly lower knowledge (as measured by the pre-test) in comparison to students in the higher socio-economic decile-rated schools. It is possible that these students may have different learning styles, resulting from exposure to different learning resources. The cause of this knowledge gap could be the result of the education provided in these schools combined with the effect of socio-economic status on these students. If students from lower socio-economic decile-rated schools have a different style of learning then Mayer's hypothesis concerning the cognitive theory of multimedia learning and overloading the visual-processing channel may explain the result of these students performing worse with the multimedia resource in comparison to the traditional resource. If students with a different style of learning struggled with the layering of the multimedia components they may have had to split their visual attention and this may have distracted from their learning. However, students with a greater exposure to different styles of learning resources may have been more comfortable with these multimedia elements (reading/audio/animations) and were therefore better able to extract and retain the information, ultimately scoring higher, as seen in the decile group A results.
Figure 5.2: A learning style model as an illustration of the relationship between socio-economic decile ratings of schools, layered levels of multimedia components and the speed/user control of the resource. The combination of these elements could be used to predict and test the most effective resource for learning of different cohorts.

I have developed a model in an attempt to illustrate this idea of learning style (Figure 5.2). The learning style model has three points of a triangle where each point correspondingly affects the other. One corner includes socio-economic decile group, or rating (decile group was used in this model as it was a relevant variable available in this study). Another corner of the model relates to layers in the multimedia content. The idea is that there is a multimedia-content hierarchy where the decile group may be correlated with the type and arrangement of multimedia components that can be used to maximise learning (Figure 5.3). The third point of the triangle model relates to speed or time that students have to work with the resource. This takes into consideration the importance of user-content control and self-paced learning, referred to as learner-content by (Moore & Zabrucky, 1999). Zhang (2010) suggests that less control over content can reduce potential learning.
Mayer and Moreno (2003) support the idea of multimedia learning style capacity, also known as cognitive capacity. They suggest that the intended learner's cognitive processing can be greater than their actual cognitive capacity—resulting in cognitive overload. This means that consideration of cognitive load when designing multimedia resources is central to meaningful learning. It may be that my attempt to provide a stimulating multimedia resource resulted in cognitive overload for some students. To resolve these issues of cognitive capacity Mayer and Moreno (2003) suggest reduction of cognitive load in multimedia learning, as a summary of twelve years of programmatic research. They use the three assumptions about how the mind works in multimedia learning: dual channel, limited capacity and active processing (as summarised in Table 5.1) (Mayer & Moreno, 2003). The idea of cognitive overload can be tested with further development of different layering and greater control by the learner in future iterations of this multimedia resource.

Figure 5.3: Multimedia-content hierarchy model where students in different decile groups are provided different type and arrangement of multimedia components in an effort to support maximum learning.
Table 5.1: Three assumptions and their definitions about how the mind works in multimedia learning (dual channel, limited capacity and active processing proposed from Mayer and Moreno’s (2003) Nine ways to reduce cognitive load in multimedia learning.

<table>
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<tr>
<th>Assumption</th>
<th>Definition</th>
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<tr>
<td>Dual channel</td>
<td>Humans possess separate information processing channels for verbal and visual material.</td>
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<tr>
<td>Limited capacity</td>
<td>There is only a limited amount of processing capacity available in the verbal and visual channels.</td>
</tr>
<tr>
<td>Active processing</td>
<td>Learning requires substantial cognitive processing in the verbal and visual channels.</td>
</tr>
</tbody>
</table>

Table 5.2 proposed by Mayer and Moreno (2003) suggests five situations where cognitive overloading can occur and nine possible solutions to the problem. Their proposed eight solutions are potential directions for further testing and analysis of the multimedia adolescent alcohol education resource that I have developed. For example one solution in particular may explain some of the results found between decile groups in this study. The concept, referred to as individualizing, proposes that low spatial ability learners may have to devote more focus to hold mental images. This can therefore result in reduced meaningful learning in comparison to individuals who possess skills in holding mental representation of images, known as the spatial ability effect. Matching cognitive load with the spatial ability of learners may be a way to reduce cognitive overload. Another suggestion by Mayer and Moreno (2003) is to provide pre-training to learners of the individual components within the resource, so that they are better able to understand the links between components when presented with the resource. In the case of the resource that I have developed and tested, students might benefit from pre-training about the human brain and its anatomy, to be able to make links more easily when the effect of alcohol is introduced. Other suggestions to reduce cognitive load that are already in place include segmenting the resource into parts and signalling key words and parts of images. Throughout Mayer and Moreno’s suggestions there are many other possible solutions that could be tested to improve meaningful learning from use of this resource, specifically for students in lower-rated socio-economic decile schools who may be at higher risk of hazardous drinking behaviour.
Table 5.2: Load-reduction methods for five overload scenarios in Multimedia instruction.

<table>
<thead>
<tr>
<th>Type of Overload Scenario</th>
<th>Load-Reduction Method</th>
<th>Effect Size</th>
<th>Description of Instructional Approach</th>
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<tr>
<td>1.7 (b)</td>
<td>Video clips</td>
<td>0.80</td>
<td>Non-use of essential materials</td>
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<tr>
<td>1.7 (c)</td>
<td>Questions</td>
<td>0.90</td>
<td>Content to contain elements</td>
</tr>
<tr>
<td>1.7 (f)</td>
<td>Video clips</td>
<td>0.80</td>
<td>Complementary processing + essential processing (reduces essential processing)</td>
</tr>
</tbody>
</table>
5.4 Effectiveness and conclusions

5.4.1 Summary of effectiveness

H1- Understanding: Can multimedia-teaching resources improve understanding of responsible alcohol consumption in adolescents, compared to a more traditional resource?
The study concludes that multimedia-teaching resources do improve understanding of responsible alcohol consumption in adolescents, when compared to current more traditional resources when testing all socio-economic groups of Year 10 as a whole. More specifically students who were exposed to the multimedia resource performed slightly better in the post-test of the 20 multi-choice knowledge test than those who had received the traditional resource (p<0.05, small effect size). Also supporting this hypothesis, after exposure to the multimedia resource, the number of students who consider themselves a binge drinker increased. This is believed to be a result of an increased understanding of what a binge drinker is after exposure to the multimedia resource in comparison to the traditional resource.

H2- Preference: Would students prefer a multimedia-teaching resource regarding responsible alcohol consumption in comparison to a more traditional resource?
The study provides evidence that students preferred the multimedia resource to the traditional styled resource. Results of preference questions demonstrated fewer students commenting that they disliked the multimedia resource, or its information delivery method in comparison to students who used the more traditional resource.

H3- Retention: Does a multimedia-teaching resource increase retention of information about responsible alcohol consumption in comparison to a more traditional resource?
The hypothesis that multimedia-teaching resources increase memory retention about responsible alcohol consumption in comparison to current resources is not supported as there were no significant differences found between the multimedia and the traditional styled resource in the follow-up testing performed three to six weeks after resource exposure. However this hypothesis warrants further testing with a longer follow-up period in future studies.
Lower socio-economic decile-rated schools appear to have the highest proportion of binge drinkers within the allocated decile group (30%), as well as the highest percentage (6%) of students that self-report binge drinking every week (compared to 0% of students in higher socio-economic decile rated schools).

Students in lower socio-economic decile schools in this study had a lower starting knowledge point than those in higher socio-economic schools. Students in higher decile schools performed significantly better after using the multimedia resource in the knowledge test and also retained informed significantly better in comparison with the traditional resource. Therefore results from the higher socio-economic decile schools supported all three hypotheses of this study (understanding, preference and retention).

By contrast, students in lower socio-economic decile schools did not score any differently when comparing results of use of resources immediately after resource exposure. However, they performed significantly better with traditional resources three to six weeks later (with lower recall loss in comparison to other groups). This greater recall suggests that a closing of the knowledge gap between students in the decile schools Group A and D has occurred three to six weeks after exposure to the traditional resource.

The lower socio-economic decile schools are comprised of over 60% Māori/Pacific students (much higher proportion than the higher socio-economic decile schools, 17%), but there was no difference in performance from either resource in this Māori/Pacific ethic population. This means that the differences found between performances and preferences of resources is not due to ethnicity, but is more likely related to socio-economic factors.

5.4.2 Recommendations

As a result of testing in schools and student feedback there are multiple changes to the resource that could be made:

- More detailed instructions of how to use the resources on the homepage.
- The “hangover” section of both resources needs to be elaborated and the symptoms of a hangover need to be further explained.
- The “after the hangover” section of the resources needs to be extended to discuss more the long-term effects of alcohol abuse for adolescents and adults. This section in the multimedia resource could be modified to include multimedia components and in the traditional resource to provide more imagery and diagrams to be consistent with the previous sections. Ultimately the “after the hangover” section could be further developed to accentuate the repercussions and leave the students with a clear and lasting message.
- The “tips on your drinking section” could be developed to include imagery or infographics to allow this information to be accentuated. In the multimedia resource this section should be redeveloped to include a multimedia aspect so as not to be overlooked by viewers (discussed in results section Chapter 4).
- The open-ended question in the post-test and follow-up test could be modified to explicitly determine if students liked or disliked the resource/or its delivery.
- In the follow-up test, the question asking if students’ drinking has changed since exposure to the resource could to be modified in order to determine if the change was an increase or decrease in student drinking (frequency/amount).

A follow-on study should carry out a six and 12-month follow-up test (five minute survey) with the students that participated in this study. These additional follow-up tests would further analyse the effectiveness of the resources with respect to the degree of retention of data. The third hypothesis that a multimedia resource increases retention of information was rejected in this study.

Laurillard (1998) explores the role of the narrative structure and its effect on the comprehension of multimedia educational resources, providing instructional design to gain theoretical understanding of the forms and functions of narrative in interactive media. A further resource should be developed including the narrative and the text elements only, with no multimedia components. This third resource would test the effectiveness of the narrative component against the multimedia components.
Further testing of the “redundancy effect” first outlined by Kalyuga, Chandler and Sweller (1908) and discussed by Mayer, Heiser and Lonn (2001) needs to be explored. Further testing should ensure that the onscreen text and narration in combination with the visual components are not overloading the audio/visual pathways of the learner inhibiting learning. All redundant material that does not add to understanding or enjoyment needs to be removed. Focus groups of adolescents would help to identify any redundant material.

Learner-content interaction or self-paced learning is another aspect of the resource that could be explored to maximize effectiveness. Learning performance and learner satisfaction have been shown to improve when a multimedia-based e-learning environment provides increased learner-content interaction (Zhang, 2010). The resource could be modified in a way to allow students to choose their own learning preference delivery (e.g. text, videos, animations, narration, music etc.). As New Zealand has such a multicultural diverse population, exploration of learner-content interaction could prove to be highly beneficial.

A bridging programme for lower socio-economic decile schools may be beneficial for students to increase their starting point knowledge to that of the higher socio-economic decile-rated schools. Marsh et al., (2008) support this idea as they have shown that multimedia resources are more effective if students are already somewhat familiar with the content.

A further analysis is required to look deeper into specific resources and programmes that are directed at these at risk populations of Maori, Pacifika and low social economic groups to understand and collaborate specific needs of these populations.

Further resource testing should strip the multimedia resource and test students from different socio-economic decile-rated schools against different multimedia content layers and user content control/self-paced learning settings, following suggestions and solutions made by Mayer and colleagues (2003) (discussed in section 5.3). If the learning-style capacity model proves correct in practice then in the future we may be
able to identify the level of multimedia interaction that would best fit the student’s needs based on the socio-economic decile rating of schools.

5.4.3 Limitations

As I was working with schools, orchestrating teachers and availability of computer rooms was restricting; time was a limiting factor throughout this research. The testing period was shortened because of delays during the ethics approval process. Given more time, I would have liked to carry out the follow-up testing at least three months after resource exposure. Because of delays in ethics approval, some schools withdrew from participation. It is unclear whether this was because of concern raised by the ethics delays or because of logistics in the school. I would have liked to travel to more schools in different regions to obtain results that are more representative of the New Zealand adolescent population. I would have then been able to compare data among regions, as well as decile ratings.

A full qualitative analysis was not carried out in this study due to the vast amount of quantitative data collected and restricted time allocation for data analysis. Further work could further investigate the qualitative results of this study. Further research could also explore the students’ take home messages after being exposed to either resource.

For this Masters thesis there was a small budget allocated. This budget limited some of the options or opportunities regarding these resources. A positive result was that because funding was limited I had to be creative with how it was used and make careful plans.

As alcohol and drug education in New Zealand is not provided in all schools this type of education is most often resourced outside of schools from the New Zealand police or Youth alcohol and drug practitioners. There is not a lot of documentation or published literature surrounding alcohol and drug education in New Zealand secondary schools. The lack of literature and multimedia educational resources available within New
Zealand meant there were not a lot of examples to refer to. The Ministry of Education has established a website database (www.tki.org.nz) called Te Kete Ipurangi (TKI) to pull together current educational resources available for New Zealand schools and communities. While TKI provides a good hub for teachers to seek resources about alcohol, as well as particular resources for Maori and Pacifica groups, the process does not ensure that all schools are being exposed to these resources.

The results of this study add significantly to our understanding of alcohol education for New Zealand adolescents and findings should be considered when developing new alcohol education resources for our youth.

5.4.4 Future directions

A- Local directions

An educational officer from the Otago police force requested a meeting to discuss the use of the multimedia resource to initiate a high school programme for all year 10 students in every school in Otago, starting 2016. His suggested programme includes a request to schools for a period for the education team to present the resource to each class, combining this with other activities that the police already have (e.g. beer goggles that mimic the perception of being intoxicated). After the team runs this program in 2016 they may look at adding another module to the programme to reinforce the first intervention and in future years create an expanded programme that is appropriate to all secondary school years (Year 9 through to Year 13). A preliminary session that introduces drug awareness, help-seeking advice and self-esteem training is being planned for use before exposure to the multimedia resource. The police education team is aware of the literature that suggests that at least three years of educational intervention is required to achieve behaviour change in adolescents. I have offered to advise the police team that builds this programme. Initially, my concept of this resource was that it would be one small part of many modules. With the police force taking up this resource, it is more likely now that there will be an opportunity to produce other resources for different levels of schooling as a complete package with several modules about different drugs.
B- National directions

The Ministry of Education and NCEA should adopt drug and alcohol learning resources that are compulsory to teach in all years of secondary school in New Zealand. There is a need for resources that can relate to several educational levels, ethnicities, genders and learning abilities.

At this point of development a pilot in one region, gathering data over several years and finding out whether this is making a difference is the goal. If this is successful then the work done in Otago could hopefully lead the way for the rest of New Zealand.

C- A move to a comprehensive approach

Rigorous reviews of current educational programmes reveal that a small proportion of programmes have demonstrated effects on reducing alcohol use in adolescents. Analysis of these successful programmes revealed the initiation of a comprehensive approach, whereby a multi-domain method involving the classroom, policy, environment, parent, and local community produced better results. These studies suggest that at least three years of constant intervention is needed to promote sustained change in an individual’s behaviour.

The literature suggests that comprehensive programmes should implement a theory-driven programme, one that builds personal and social skills, and addresses social norms of alcohol use (Midford & McBride, 2004; Spoth, Greenberg, & Turrisi, 2008: 2009; Stigler et al., 2011). This approach should also involve interactive teaching methods and resources, peer leader involvement, training and support to interventions and facilitators. Lastly, the intervention should promote correct delivery and evaluation over several years of a multi-domain method, and consider the cultural and developmental requirements of the adolescent.

Various limitations of a comprehensive approach exist, including: parent, school and community reluctance, resource security, cultural and developmental requirements, and control of data and evaluation methods. If these limitations are overcome, an intertwined multi-year, multi-component and multi-domain approach with effective
multimedia resources and interventions could be the most efficient way to change the cultural norm of alcohol behaviour in New Zealand adolescents.

The novelty of this research is that it is the first to compare multimedia resources with traditional text style resources in regards to youth alcohol education and the effects of alcohol on the brain. This is also considered to be a limitation to the thesis discussion, as this study in most instances cannot be directly compared to reviews of other alcohol education resources available in the literature where variables are so different. While further research and development is required on these resources, this thesis represents a significant step in the process.
Creative Component links

**Resource A**
Traditional: [www.yourbrainonbooze.squarespace.com](http://www.yourbrainonbooze.squarespace.com)
Password: ScicommResourceA
Website name: Your Brain on Booze
This website does not contain any extra colour, imagery, banners, or design detail. Within this resource there is only text (no character or narrative) and only diagrammatic images of the brain. These images are not within a gallery, nor can they be magnified.

**Resource B**
Multimedia: [www.smashed.squarespace.com](http://www.smashed.squarespace.com)
Password: ScicommResourceB
Website name: Your Brain on Booze
This website includes the multimedia components of film, journal clips, anatomical photography, animations, narration, podcasts, music, text and narrative. The combination of these components means that students can read, listen, or watch each section, depending on the participant's personal preference.
References


Cafferty, E. I. (1980). An analysis of student performance based upon the degree of match between the educational cognitive style of the teacher and the educational cognitive style of the students.


## Year 10 Health Programme Links to the NZC

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<td></td>
<td></td>
<td>Equity</td>
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<td></td>
<td></td>
<td>Integrity</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Internally assessed – 2 credits</td>
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<td></td>
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</tbody>
</table>
### HEALTH Unit Plan

**Unit 2 Title:** Keeping Ourselves Safe: Alcohol & Cannabis  
**Key Area of Learning:** Mental Health  
**Year:** 10  
**Curriculum level(s):** 5  
**Duration:** 7-8 Lessons  
**Credits:** 2

<table>
<thead>
<tr>
<th>Values</th>
<th>How students will be encouraged to develop the selected value or values during the unit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellence - aiming high, persevering</td>
<td>Students look for knowledge about the effects of alcohol and cannabis so good responsible decisions can be made that enhance our own health and the health and well-being of others.</td>
</tr>
<tr>
<td>Innovation, inquiry and curiosity</td>
<td>Looking at the impact alcohol and cannabis has on our society.</td>
</tr>
<tr>
<td>Diversity - culture, language, heritage</td>
<td>Students are encouraged to use integrity in decision making situations and also to look out for others so harm can be minimized.</td>
</tr>
<tr>
<td>Respect - for themselves and others</td>
<td></td>
</tr>
<tr>
<td>Equity - fairness and social justice</td>
<td></td>
</tr>
<tr>
<td>Community and participation for the common good</td>
<td></td>
</tr>
<tr>
<td>Care for the environment</td>
<td></td>
</tr>
<tr>
<td>Integrity - accountability, honesty, acting ethically</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key Competencies</th>
<th>How students will be encouraged to develop the selected competency(ies) during the unit.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Managing self - self-motivation, personal goals, appropriate behaviour, resourcefulness, sense of self and importance of heritage.</td>
<td>Students use appropriate behaviour in class discussions and activities.</td>
</tr>
<tr>
<td>Relating to others - listen actively, recognise different points of view, negotiate, share ideas.</td>
<td>Students realise that choices have consequences that affect themselves, others and society as a whole.</td>
</tr>
<tr>
<td>Participating and Contributing - balancing rights, roles and responsibilities, and responding appropriately as a group member.</td>
<td>Sharing stories/knowledge and responding appropriately in the assertiveness assessment activity.</td>
</tr>
<tr>
<td>Thinking - using creative, critical, meta-cognitive and reflective processes, drawing on personal knowledge and intuitions.</td>
<td>Students find out how to access helping agencies.</td>
</tr>
<tr>
<td>Using language, symbols and texts - interpreting language and symbols, using ICT, recognising our choices of language and symbols affect peoples understanding.</td>
<td>Students know how to find the standard drink symbol on alcoholic drink containers and understand what the percentage of alcohol per volume means and how this can assist them to make good decisions in social situations.</td>
</tr>
</tbody>
</table>

**Principles**


Each of the Principles, as foundations of school-wide curriculum decision making, are well-matched to the Health Education supporting curriculum document and the philosophy behind good teaching in Health.

**Learning Area Underlying Concepts**

*Hauora: How well-being can be affected by how we manage ourselves and how we relate to others.*  
*Health Promotion: Creating a supportive classroom environment so that the diversity of opinion can occur.*  
*Socio – ecological: Mutual care and shared responsibility for maintaining and developing positive relationships through effective communication for self, others and society.*

**Attitudes and Values:** Develop a positive and responsible attitude to well-being. Respect for themselves and the rights of others.

**Assessment for Learning**

- Feedback and feed forward consistently given in relation to the students learning journal (a reflective journal as part of the unit). Feedback and feed forward consistently given in relation to the interactive activities.
- Help support agencies and strategies identified explored and shared with the school/community.
- Demonstration and application of problem solving skills.
- Time is often a constraint in Health Education so ongoing 'assessment snap shots' to improve student learning is key here, rather than an emphasis on summative tests.
Appendix I- Resource design documents

<table>
<thead>
<tr>
<th>Develop knowledge of the rights and responsibilities, laws, policies and practices that exist to create a healthy society as regards alcohol and cannabis</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Identify and evaluate health care agencies which contribute to the well-being of community members in relation to cannabis/alcohol use (D1)</td>
</tr>
<tr>
<td>- Demonstrate understanding of school policies and laws and legislative in relation to tobacco/cannabis (E3A4)</td>
</tr>
<tr>
<td>- Investigate social influences on student communities in relation to drug use and unsafe sex and what can be done to promote health-enhancing decisions (B1 &amp; 4)</td>
</tr>
<tr>
<td>- Investigate and describe lifestyle factors and media influences contributing to common health problems in relation to alcohol and cannabis (B3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Resources: Caring for Ourselves and Others - Volumes 1 &amp; 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Alcohol/Cannabis laws</td>
</tr>
<tr>
<td>- Drinking and driving - Dudley Lively activity</td>
</tr>
<tr>
<td>- To finish first video</td>
</tr>
<tr>
<td>- Match the offence with the penalty</td>
</tr>
<tr>
<td>- Newspaper articles</td>
</tr>
<tr>
<td>- School Drug policy</td>
</tr>
<tr>
<td>- Streetwise video - Gordon’s story (32mins)</td>
</tr>
<tr>
<td>- Brainstorm the impact alcohol and cannabis have on our society</td>
</tr>
<tr>
<td>- Helping Agencies - how to access them, what do they offer, are they any good? How could we provide a better service to our young people to reduce the impact alcohol/cannabis has on their lives?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Socio-ecological perspective</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Recognise the social influences on drug use and release</td>
</tr>
<tr>
<td>- Health Promotion - Understand how school policy is developed and take action to improve well-being in the school environment</td>
</tr>
<tr>
<td>- Attitudes and Values - core concern for others</td>
</tr>
</tbody>
</table>
# Appendix I - Resource design documents

## Filming details and restrictions of Mscicomm - Shanti Campbell. Film component for alcohol education resource.

<table>
<thead>
<tr>
<th>Location of Filming:</th>
<th>4a Hyde Street (flintstones flat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date and time of Filming:</td>
<td>Thursday 12th March 7pm-11pm</td>
</tr>
<tr>
<td>Description:</td>
<td>Actors will be filmed consuming alcohol and demonstrating the effects of alcohol intoxication.</td>
</tr>
<tr>
<td>Main contact:</td>
<td>Teri Kerns</td>
</tr>
<tr>
<td>Contact details:</td>
<td>Teri Kerns email: <a href="mailto:terikearns@hotmail.com">terikearns@hotmail.com</a> Phone: 0277371205</td>
</tr>
<tr>
<td>All actors:</td>
<td></td>
</tr>
<tr>
<td>2. Sophie Lester</td>
<td>DOB: 07/01/1994</td>
</tr>
<tr>
<td>3. Ben Youngman</td>
<td>DOB: 03/01/1995</td>
</tr>
<tr>
<td>5. Jess Patrick</td>
<td>DOB: 16/01/1994</td>
</tr>
<tr>
<td>6. Ty Pelasio</td>
<td>DOB: 10/03/94</td>
</tr>
<tr>
<td>7. Tammy Douglas</td>
<td>DOB: 15/03/1994</td>
</tr>
</tbody>
</table>

## Restrictions:
- No other persons are permitted on the premise while filming.
- Actors must follow all directions given by crew, for theirs and others safety.
- Actors will not touch film equipment, or crew
- You will not put yourself, or others directly in danger.
- You will consume food before the filming, during and after filming (food will be provided).
- Actors must not leave location, post filming for the remainder of the night.

## Signature and dated:

1. [Signature] 10/03/2015
2. [Signature] 19/03/2015
3. [Signature] 10/03/2015
4. [Signature] 10/03/2015
5. [Signature] 10/03/2015
6. [Signature] 10/03/2015
7. [Signature] 10/03/2015
8. [Signature] 10/03/2015

*Matt Cotter (land lord): 07 3100529 mcott@ctk.com 10. Nr*
Appendix I - Resource design documents

Master of Science Communication in Science and Natural History Filmmaking

Location Release Form

I/we agree to allow students from the University of Otago Master of Science Communication in Science and Natural History Filmmaking course to film and take photographs and make sound recordings on my property (address) 4a Hyde Street
between the dates of 12th March 2015 and 10/03/2015

The students will take all reasonable care to prevent any damage to the property and to leave the property in good condition upon completion of filming.

All rights in the films, tapes, photos and recordings will belong to University of Otago to use as they wish worldwide, in perpetuity. I have the right and authority to give this permission. I warrant that the use of the property will not infringe on any other person or violate policy. I agree to indemnify University of Otago against all claims made from any breach of this agreement. I agree not to seek any claims or fees relating to this agreement.

Signature: .................................................................

(Owner) Name; (Please print) Teri Kearns

Company name: ..............................................

Address: 4a Hyde Street North Dunedin
Dunedin 7016

Date 10/03/2015

Phone 027731205

Email teri.earns@hotmail.com

PO Box 56, Dunedin, New Zealand.
Tel 64 3 479 7654 • Fax 64 3 479 7384
Email sciencecommunication@otago.ac.nz • Web www.sciencecommunication.info

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Appendix I - Resource design documents

Master of Science Communication in Science and Natural History Filmmaking

Appearance Release Form

I hereby agree to being filmed by students of the Master of Science Communication in Science and Natural History Filmmaking and that any material arising from such filming which contains my name, likeness, image, voice or performance may be used worldwide in perpetuity for their films or any products arising out of them.

Any statements made by me during my appearance are to the best of my knowledge true and that neither those statements nor my appearance will violate or infringe upon the rights of any other person.

It is agreed that the rights to that material belong with the University of Otago and that:
- neither the University of Otago, Natural History New Zealand (NIHZ), the masters students nor the Director of the course shall be liable for anything whatsoever associated with the use of that material.
- editorial control of the films rests with the diploma students and the Director of the course
- no compensation, monetary or otherwise, is required for use of the material in the student films or any products arising out of them.

Signed: ____________________________

Date: 12/03/15

Address: 40 Aira Street

North Dunedin 9016

Phone: 027 268 0499

Email: sophie.victoria.marsden@gmail.com

PO Box 55, Dunedin, New Zealand.
Tel 64 3 479 7654 • Fax 64 3 479 7584
Email scienceremunication@otago.ac.nz • Web www.scienceremunication.info
Appendix I- Resource design documents

Master of Science Communication in Science and Natural History Filmmaking

Appearance Release Form

I, [Name], hereby agree to being filmed by students of the Master of Science Communication in Science and Natural History Filmmaking and that any material arising from such filming which contains my name, likeness, image, voice or performance may be used worldwide in perpetuity for their films or any products arising out of them.

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* editorial control of the films rests with the diploma students and the Director of the course
* no compensation, monetary or otherwise, is required for use of the material in the student films or any products arising out of them.

Signed: [Signature]

Date: 10/3/15

Address: [Address]

Phone: [Phone Number]

Email: [Email]

PO Box 56, Dunedin, New Zealand.
Tel 64 3 479 7654 • Fax 64 3 479 5584
Email sciencecommunication@otago.ac.nz • Web www.sciencecommunication.info
Appendix I- Resource design documents

Master of Science Communication in Science and Natural History Filmmaking

Appearance Release Form

I, Nickie Hodges, hereby agree to being filmed by students of the Master of Science Communication in Science and Natural History Filmmaking and that any material arising from such filming which contains my name, likeness, image, voice or performance may be used worldwide in perpetuity for their films or any products arising out of them.

Any statements made by me during my appearance are to the best of my knowledge true and that neither those statements nor my appearance will violate or infringe upon the rights of any other person.

It is agreed that the rights to that material belong with the University of Otago and that:

* neither the University of Otago, Natural History New Zealand (NHNZ), the masters students nor the Director of the course shall be liable for anything whatsoever associated with the use of that material;
* editorial control of the films rests with the diploma students and the Director of the course;
* no compensation, monetary or otherwise, is required for use of the material in the student films or any products arising out of them.

Signed: ________________________________

Date: 10/12/15

Address: 6 A Hyde Street
North Dunedin

 Cochmor Ph: 021 435 942
Email: nickieho2@gmail.com

PO Box 56, Dunedin, New Zealand.
Tel 64 3 479 7634 • Fax 64 3 479 7584
Email: sciencecommunication@otago.ac.nz • Web www.sciencecommunication.info
Appendix I- Resource design documents

Master of Science Communication in Science and Natural History Filmmaking

Appearance Release Form

I, Te Reina pelesia, hereby agree to being filmed by students of the Master of Science Communication in Science and Natural History Filmmaking and that any material arising from such filming which contains my name, likeness, image, voice or performance may be used worldwide in perpetuity for their films or any products arising out of them.

Any statements made by me during my appearance are to the best of my knowledge true and that neither those statements nor my appearance will violate or infringe upon the rights of any other person.

It is agreed that the rights to that material belong with the University of Otago and that

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Signed:

Date: 10/03/15

Address: 39a Duke St, North Dunedin, Dunedin

Phone: 647 3471231

Email: Te Reina pelesia, Dinsmore.com

PO Box 56, Dunedin, New Zealand.
Tel 64 3 479 7684 • Fax 64 3 479 7584
Email sciencecommunication@otago.ac.nz • Web www.sciencecommunication.info

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Appendix I- Resource design documents

Master of Science Communication in Science and Natural History Filmmaking

Appearance Release Form

I, Tammy Douglas, hereby agree to being filmed by students of the Master of Science Communication in Science and Natural History Filmmaking and that any material arising from such filming which contains my name, likeness, image, voice or performance may be used worldwide in perpetuity for their films or any products arising out of them.

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* editorial control of the films rests with the diploma students and the Director of the course
* no compensation, monetary or otherwise, is required for use of the material in the student films or any products arising out of them.

Signed:  

Date: 10/3/15  

Address: 7 Hyde St  

Phone: 07 365 1456  

Email: Tammy.douglas@xmail.otago.ac.nz

PO Box 56, Dunedin, New Zealand
Tel 64 3 479 7654 • Fax 64 3 479 7584
Email sciencecommunication@otago.ac.nz • Web www.sciencecommunication.info
Appendix I- Resource design documents
## Appendix I- Resource design documents

<table>
<thead>
<tr>
<th>SHOT</th>
<th>VISION</th>
<th>NOTES</th>
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</thead>
<tbody>
<tr>
<td>Journal entry</td>
<td>Main narrator journal entry (webcam style)</td>
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<tr>
<td>Adolescence</td>
<td>Example of... Introduction of actors, thoughts on alcohol</td>
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<tr>
<td>Library shots</td>
<td>- Competitive elimination</td>
<td>Shot of repetition</td>
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<tr>
<td></td>
<td>- Sip of alcohol</td>
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<tr>
<td></td>
<td>- Pouring of alcohol</td>
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<td></td>
<td>- Glass down</td>
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<td></td>
<td>- Alcohol conc. example</td>
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<td></td>
<td>- Meal</td>
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<td>- Vein shot</td>
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<td></td>
<td>- Variance shot</td>
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<td></td>
<td>- Breath shot</td>
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<td></td>
<td>- Sip to brain</td>
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<td></td>
<td>- Sip and relax</td>
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<td></td>
<td>- Getting ready</td>
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<td>- Outfit choosing</td>
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<td>- Chatting</td>
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<td></td>
<td>- Responding</td>
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<tr>
<td></td>
<td>- Drinking shots</td>
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<td></td>
<td>- Laughter</td>
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</tr>
<tr>
<td>1- Euphoria</td>
<td>- Relaxed and social</td>
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<td></td>
<td>- Self confident</td>
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<td></td>
<td>- Less anxious and socially inhibited</td>
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<td></td>
<td>- Loose and unpredictable behaviour</td>
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<td></td>
<td>- Close up of ear, listening, eyes</td>
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<td></td>
<td>- Visualising or understanding emotional</td>
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<td></td>
<td>- Difficult understanding situation</td>
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<td></td>
<td>- Inappropriate response</td>
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<td></td>
<td>- Breaking the seal</td>
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<td></td>
<td>- Flushed appearance</td>
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<tr>
<td></td>
<td>- Sweating</td>
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<td>2- Lethargy</td>
<td>- Changes in reactions</td>
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<td></td>
<td>- Clumsiness</td>
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</tr>
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<td></td>
<td>- Delayed/slurred speech (a lot)</td>
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<tr>
<td></td>
<td>- Drink spill</td>
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<tr>
<td></td>
<td>- Vision blur</td>
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</tr>
<tr>
<td></td>
<td>- Zoning out (spaced out)</td>
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<tr>
<td></td>
<td>- Movement uncoordinated</td>
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<td></td>
<td>- Thinking about moving</td>
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</table>
## Appendix I - Resource design documents

<table>
<thead>
<tr>
<th>3: Confusion</th>
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<tbody>
<tr>
<td>Confused</td>
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<tr>
<td>Analgesia</td>
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<tr>
<td>Temperature unrecognition</td>
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<tr>
<td>Lack of reflexes</td>
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<tr>
<td>Decrease in awareness</td>
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<td>Aggressive</td>
</tr>
<tr>
<td>Argumentative</td>
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<tr>
<td>Fall asleep</td>
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<tr>
<td>Sleeping shot</td>
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<tr>
<td>Insomnia shot?</td>
</tr>
<tr>
<td>Blacking out, ridiculous</td>
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<tr>
<td>Anger</td>
</tr>
<tr>
<td>Fear</td>
</tr>
<tr>
<td>Pleasure</td>
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<tr>
<td>Emotional and overwhelmed</td>
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<tr>
<td>Desire for closeness</td>
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<td>Staggering walk and speech</td>
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<td>Withdrawn and quiet</td>
</tr>
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<td>Talking rubbish</td>
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<td>Sexual arousal</td>
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<tr>
<td>Lack of sexual performance</td>
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<td>Dizzy</td>
</tr>
<tr>
<td>Nauseous/vomiting</td>
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<tr>
<td>Heat beat</td>
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<tr>
<td>Breathing rate</td>
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</table>

<table>
<thead>
<tr>
<th>4: Stupor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jerky, uncoordinated ataxia</td>
</tr>
<tr>
<td>Unconsciousness</td>
</tr>
<tr>
<td>Bladder control</td>
</tr>
<tr>
<td>Breathing/heart rate</td>
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</table>

| 5: Coma None                     |

<table>
<thead>
<tr>
<th>The Hangover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Journal clip</td>
</tr>
<tr>
<td>Shakes</td>
</tr>
<tr>
<td>Sweating</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
</tr>
<tr>
<td>Stomach pains</td>
</tr>
<tr>
<td>Congeners flash back</td>
</tr>
<tr>
<td>Trying to sleep</td>
</tr>
<tr>
<td>Groggy/tired</td>
</tr>
</tbody>
</table>

| Extras                            |

---

Shanti Campbell - MSciComm

March 2015

---

S. Campbell
<table>
<thead>
<tr>
<th>Title</th>
<th>Address</th>
<th>Animator/Contact details</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>External brain to internal. Looking at firing neuronal networks. No narration or soundtrack.</td>
<td>YouTube: <a href="https://www.youtube.com/watch?v=OWD1kMh57yI">https://www.youtube.com/watch?v=OWD1kMh57yI</a></td>
<td>Drew Berry. Australian Academy of Science. Creative Commons Attribution license (reuse allowed). Email: <a href="mailto:berry@wehi.edu.au">berry@wehi.edu.au</a></td>
<td>2014 Feb 24. Published on YouTube.</td>
</tr>
<tr>
<td>Inspiring Smarter Brain Research in Australia.</td>
<td>YouTube: <a href="https://www.youtube.com/watch?v=zXLeJFu57Wg">https://www.youtube.com/watch?v=zXLeJFu57Wg</a></td>
<td>Drew Berry. Whole Brain Catalog. Permission from Drew Berry. Email: <a href="mailto:berry@wehi.edu.au">berry@wehi.edu.au</a></td>
<td>2013 Oct 16. Published on YouTube.</td>
</tr>
<tr>
<td>Explanation of adolescence. Parts of the video will be used. Under construction:</td>
<td>YouTube: <a href="https://www.youtube.com/watch?v=g2gVzVIBcRg">https://www.youtube.com/watch?v=g2gVzVIBcRg</a></td>
<td>Winston Tan (Media Liaison Officer). Ph: (03) 9092 6771. Email: <a href="mailto:winston.tan@easternhealth.org.au">winston.tan@easternhealth.org.au</a></td>
<td>2013 March 7. Published on YouTube.</td>
</tr>
</tbody>
</table>

**Title**

- External brain to internal
- Inspiring Smarter Brain Research in Australia
- Explanation of adolescence

**Address**

- YouTube: https://www.youtube.com/watch?v=OWD1kMh57yI
- YouTube: https://www.youtube.com/watch?v=zXLeJFu57Wg
- YouTube: https://www.youtube.com/watch?v=g2gVzVIBcRg

**Animator/Contact details**

- Drew Berry. Australian Academy of Science. Creative Commons Attribution license (reuse allowed). Email: berry@wehi.edu.au
- Drew Berry. Whole Brain Catalog. Permission from Drew Berry. Email: berry@wehi.edu.au

**Summary**

- 2014 Feb 24. Published on YouTube.
- 2013 Oct 16. Published on YouTube.
- 2013 March 7. Published on YouTube.
Appendix II- Questionnaires

Entry Test

Default Question Block

What is your religion? Choose as many that apply.

- Christian
- Anglican
- Catholic
- Presbyterian
- Methodist
- Muslim
- Buddhist
- Other

We would now like to ask some questions about alcohol. By this we mean beer, wines,
spirits, spirit-based drinks, have you ever drunk alcohol (not counting a few sips)?

- Yes
- No
- I'm not sure

During the past 4 weeks, about how often did you drink alcohol?

- Every day
- 2-3 times a week
- 1-2 times a week
- Less than once a week
- Never

What is your height? Use any object you can find.

What is your weight? Use any object you can find.

Which home territory did you grow up in?

School

What are you?

- Female
- Male
- Other

How did you get there?

- Car
- Bus
- Cycle
- Walk
- Train
- Other

What ethnic group do you belong to? Choose as many that apply.

- Māori
- Samoan
- Nga Pāua
- Other

New Zealand European

Your anonymity will be preserved. Your answers will only be used to track trends, but your
name will be recorded along with the anonymous data and will be used in aggregate form.
The data will be made available to researchers at the University of Otago, Christchurch.
Your answers will not reveal your identity.
Appendix II - Questionnaires

- Do you drink or do you choose to drink alcohol? Choose as many that apply.
- Would you say you have a problem with alcohol use?
- When there were words you use to describe why people use alcohol?
Appendix II - Questionnaires

Why is it dangerous to drink alcohol too quickly?

- I'm not sure
- Your brain's immediate response is the start of an unconscious reaction to the alcohol
- It's true, you need to take your time
- You might want to slow down
- It affects your reflexes
- It affects your coordination
- You might feel that you need to increase the pace

What is the underlying reason for drinking too quickly?

- I'm not sure
- The brain's response is the start of an unconscious reaction to the alcohol
- You might want to slow down
- You need to take your time
- It affects your reflexes
- It affects your coordination
- You might feel that you need to increase the pace

What part of the brain is responsible for the behaviors above?

- I'm not sure
- Loss of coordination
- Feeling drunk, feel disoriented
- Feeling relaxed, sociable and confident
- You may feel happy when drinking alcohol because of the release of hormones.
Appendix II - Questionnaires

What should you do if you feel like you’re not in control when drinking alcohol?

○ Drink it out
○ Drink more water
○ Drink more alcohol

When you feel too relaxed, you should:

○ Drink more alcohol
○ Drink more water
○ Eat more
○ Eat more water

The blood test is where you can:

○ The blood test is where you can:
○ Drink alcohol
○ Drink more water

After your level of consciousness can make your hangover worse and can be found in:

○ Drink

Most of the time you will:

○ Drink

○ Eat

○ Drink water

○ Eat

○ Drink water

What might your body need in the mornings when drinking alcohol?

○ Lose of bladder control
○ Lose of bladder control
○ Laxative
○ Laxative

When hangover symptoms can occur:

○ Headache
○ Headache

○ Sore throat
○ Sore throat

○ Depressed mood
○ Depressed mood

○ Improved energy and reduced fatigue
○ Improved energy and reduced fatigue

○ In the heat of confusion, the frontal lobe can cause problems:

○ In the heat of confusion, the frontal lobe can cause problems:

○ In the heat of confusion, the frontal lobe can cause problems:

○ In the heat of confusion, the frontal lobe can cause problems:

○ In the heat of confusion, the frontal lobe can cause problems:

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Appendix II - Questionnaires

Do you think food consumption can have long term effects on your health?

[ ] Yes
[ ] No
[ ] I'm not sure

For what reasons do you feel eating can be dangerous for your health? Choose as many as apply.

[ ] [ ] [ ] [ ] [ ]

Try to answer these questions. These questions have been kept as short and as simple.

If you had problems or concerns due to alcohol use, whom would you go to for help?

[ ] Other
[ ] My friend
[ ] My family
[ ] My doctor
[ ] My school counselor
[ ] My pharmacist
[ ] My teacher
[ ] My parent
[ ] My school administrator
[ ] My school principal

Choose a point

When do you think is the easiest time to stop drinking?

[ ] 0
[ ] 1
[ ] 2
[ ] 3
[ ] 4
[ ] 5
[ ] I'm not sure

Try to answer some one can find it difficult to organise a safe home.
Appendix II - Questionnaires

Do you think New Zealand has a problem with alcohol use?

☐ I don’t think
☐ I’m not sure
☐ No
☐ Yes

Are you worried about how much alcohol you drink?

☐ I don’t know what a binge drinker is
☐ I don’t drink
☐ I’m not sure
☐ No
☐ Yes

Do you consider yourself a binge drinker?

School

Your full name

University of Otago Library (Otago, New Zealand) and will preserve your anonymity.

Your anonymity will be preserved. Your name will only be used to track your visits to this page.
Appendix II - Questionnaires

What type of memory do you use to remember facts and figures?

- Visual
- Auditory
- Kinesthetic
-associative
- Logical
- Spaced repetition

What type of learning style do you prefer?

- Visual
- Auditory
- Kinesthetic
- Logical
- Spatial
- Verbal

How do you typically learn new information?

- Reading
- Listening
- Writing
- Speaking
- Seeing
- Doing

What is your current level of education?

- High school
- College
- University
- Graduate
- Postgraduate

What are your career goals?

- Professional
- Entrepreneur
- Travel
- Educator
- Volunteer

How do you typically prepare for exams?

- Studying
- Practicing
- Reviewing
- Teaching
- Participating

What are your favorite subjects?

- Mathematics
- Science
- History
- Literature
- Art

What are your weakest subjects?

- Mathematics
- Science
- History
- Literature
- Art

How do you typically approach problem-solving?

- Logical
- Analytical
- Intuitive
- Creative
- Critical

What are your strengths?

- Leadership
- Communication
- Adaptability
- Problem-solving
- Teamwork

What are your weaknesses?

- Leadership
- Communication
- Adaptability
- Problem-solving
- Teamwork

How do you typically handle stress?

- Exercise
- Meditation
- Music
- Sleeping
- Socializing

What are your favorite hobbies?

- Reading
- Painting
- Cooking
- Hiking
- Gardening

How do you typically relax?

- Reading
- Painting
- Cooking
- Hiking
- Gardening
Appendix II - Questionnaires

What should you do if you feel like you're not in control when drinking alcohol?

- Drink more slowly
- Drink less
- Don't drink
- Keep to water
- Leave
- Drink more alcohol

When you feel too intoxicated, you should:

- Ask for more food
- Get more exercise
- Eat your drink
- Take your own drinks back
- Request your meal

The better this is when you can:

- Take more time
- Sleep
- Feel confident
- Feel more relaxed
- Feel more awake and alert

When hangovers disappear can cause:

- Don't drink
- Water
- Energy
Appendix II - Questionnaires

**Do you think local consumption can have long-term effects on your brain?**

- None
- Yes

**What things do you think drinking can do for your brain? Choose as many.**

- Repeat
- Schedule
- Communication
- Ethics
- Environment
- Economy

**What are your main concerns when drinking?**

- Taste
- Price
- Quality
- Speed
- Health

**When do you think it’s reasonable to drink?**

- Don’t know
- Anytime

**If you had problems or concerns due to alcohol use, what would you go to help?**

- Choose a friend
- Public health
- Doctor
- Family doctor
- Personal health
- Personal intervention

**What do you think are the long-term effects of drinking?**

- None
- Yes

**If you had a choice between drinking and exercising, which would you choose?**

- Choose a friend
- Public health
- Doctor
- Family doctor
- Personal health
- Personal intervention

**What are the personal benefits of drinking?**

- Repeat
- Schedule
- Communication
- Ethics
- Environment
- Economy

**What are the main reasons for drinking?**

- None
- Yes

**If you had problems or concerns due to alcohol use, what would you go to help?**

- Choose a friend
- Public health
- Doctor
- Family doctor
- Personal health
- Personal intervention
Appendix II - Questionnaires

Do you think there's a problem with alcohol use?

☐ I don't drink
☐ I'm not sure
☐ Yes
☐ No

Are you worried about how much alcohol you drink?

☐ I don't know what a binge drink is
☐ I don't drink
☐ I'm not sure
☐ No
☐ Yes

Do you consider yourself a binge drinker?
Appendix II - Questionnaires

You may feel happy when drinking alcohol because of the release of hormones.

I'm not sure ☐
Drunking up ☐
Swallowing down ☐

Overall alcohol nausea in your brain:

I'm not sure ☐
Sick to my core ☐
Dizzy ☐
Deer ☐
Weird ☐

What part of the brain is responsible for the symptoms above?

I'm not sure ☐
Loss of coordination ☐
Feeling uneasy, out of control, uncoordinated and unsteady ☐
Feeling relaxed, social and confident ☐

What are the real effects of drinking alcohol?

I'm not sure ☐
Decreased ☐
Appendix II - Questionnaires
Appendix II - Questionnaires

The school where you go to school. When did you start in this school?

[Answer Options]

The school where you go to school. What subjects do you like?

[Answer Options]

The school where you go to school. What subjects do you dislike?

[Answer Options]

The school where you go to school. Do you have any hobbies or interests outside school?

[Answer Options]

The school where you go to school. What are your future goals or aspirations after completing school?

[Answer Options]

The school where you go to school. How do you usually spend your weekends or free time?

[Answer Options]

The school where you go to school. What do you think is the most important factor in determining your success in school?

[Answer Options]

The school where you go to school. What do you think are the biggest challenges you face in your studies or school life?

[Answer Options]

The school where you go to school. How do you usually deal with challenges or difficulties in your studies or school life?

[Answer Options]

The school where you go to school. Do you have any friends or family members who attend the same school as you?

[Answer Options]

The school where you go to school. What do you think are the strengths and weaknesses of your school?

[Answer Options]

The school where you go to school. What would you change about your school if you could?

[Answer Options]

The school where you go to school. What advice would you give to someone who is starting their first year of school?

[Answer Options]
Appendix III- Ethical approval documentation

RE: Alcohol Education University of Otago Study

Needed: Classes of secondary school students in 2015 to test effectiveness of teaching resources designed to increase students’ understanding of effects of alcohol on their brain. Please feel free to forward this information to colleagues who may be interested in participating.

The aim of this study is to provide an education resource that will play a part in changing the binge drinking culture of New Zealand. Because binge drinking can affect adolescents during a vulnerable period of brain development, we are particularly targeting secondary students. This research needs participation of teachers and students in order to test the education resource and improve its design.

Who are we?
Shanti Campbell is a postgraduate research student doing the Master of Science Communication under the supervision of Professor Nancy Longnecker and Associate Professor Christine Jasoni from the Brain Health Research Centre at the University of Otago. Shanti is developing a teaching resource for adolescents and will be testing its effectiveness in the 2015.

What is the resource?
A multimedia web page designed for adolescents (Year 10) regarding alcohol harm reduction and the effects of alcohol on the brain. The web page will take students through a journey of an adolescent’s binge drinking experience, using various applications of film, anatomy photography, 3-D animations of the brain, narration and music. This will be a one of a kind educational resource, pushing the boundaries of interactive and multimedia learning. Your class will be divided into two, one half studying information from this multimedia resource and one half studying the same information from an online, but more traditional resource.

What will be required of you?
We understand how busy a teacher’s schedule is and have designed this study to be as simple as possible for you. Feedback is welcome if there is something we can do to make participation easier.

We ask you to:
- Collect consent forms from parents/guardians for student participation.
- Book a computer lab for one teaching period (1 hour) in May 2015.
- Answer a few questions about the experience with the student researcher on the day of testing (15 minutes).
- Three months after exposure book the computer lab for 15 minutes and supervise your class completing the online follow-up test and answer a few questions yourself.

What school resources will be required?
- Your time (parental consent, testing times and answering questions)
- Computer lab with access to sound for 1 class period and 15 minutes follow-up test 3 months later.

What benefit will participation have for your class?
- Your students will have a better understanding of the effects of alcohol on the brain and how the drug works in their body.
- Exposure to this information will enable students to make better decisions.
Appendix III- Ethical approval documentation

- To be a part of a current research study in New Zealand that aims to help change the binge drinking culture.

How is this resource tied to school curriculum?
Exposure to this resource will fit into the Health and Physical Education New Zealand Curriculum of Strand A: Personal Health and Physical Development: Safety and Risk Management:
- Level 4: Students will access and use information to make and action safe choices in a range of contexts when dealing with alcohol.
- Level 5: Strategies to minimize risk and to manage risk situations strategies for managing the risks of drug use.
- Level 6: Students will distinguish between real and perceived risks in physical and social environments and develop skills for appropriate action in relation to drug use.

Learning Objectives:
- Understand the basic brain anatomy and lobe functions.
- Understand the symptoms associated with alcohol intoxication and the parts of the brain affected.
- Understand and distinguish risky drinking and binge drinking.
- Enable students to make safer drinking decisions.

We thank you for taking time to read this and hope to hear from teachers who are willing to participate in this important study aiming to help change the binge drinking culture of New Zealand.

If you would like additional information or have any questions please contact Shanti. You are also welcome to contact Professor Nancy Longnecker to discuss any aspect of this research.

We are happy to discuss any element of the study with you.

Yours Sincerely,

Master's Student: Shanti Campbell
Email: camsa633@student.otago.ac.nz
Ph: 0273426255

Supervisor: Prof. Nancy Longnecker
Email: nancy.longnecker@otago.ac.nz
Phone: 03 479 7885
Appendix III- Ethical approval documentation

Wednesday, 17 December 2014.
Professor Nancy Longnecker,
Centre for Science Communication,
DUNEDIN.

Tē Kōe Professor Nancy Longnecker,
Adolescent Alcohol Education in New Zealand Impact of a Multimedia Teaching Resource.

The Ngāi Tahu Research Consultation Committee (the committee) met on Tuesday, 16 December 2014 to discuss your research proposition.

By way of introduction, this response from the Committee is provided as part of the Memorandum of Understanding between Te Rūnanga o Ngāi Tahu and the University. In the statement of principles of the memorandum, it states “Ngāi Tahu acknowledges that the consultation process outlined within this policy provides no power of veto by Ngāi Tahu to research undertaken at the University of Otago”. As such, this response is not “approval” or “mandate” for the research, rather it is a mandated response from a Ngāi Tahu appointed committee. This process is part of a number of requirements for researchers to undertake and does not cover other issues relating to ethics, including methodology they are separate requirements with other committees, for example the Human Ethics Committee, etc.

Within the context of the Policy for Research Consultation with Māori, the Committee bases its consultation on that defined by Justice McGechan:

“Consultation does not mean negotiation or agreement. It means: setting out a proposal not fully decided upon, adequately informing a party about relevant information upon which the proposal is based; listening to what the others have to say with an open mind (in that there is room to be persuaded against the proposal); undertaking that task in a genuine and not cosmetic manner. Reaching a decision that may or may not alter the original proposal.”

The Committee considers the research to be of interest and importance.

The Committee notes and comments that ethnicity data is to be collected as part of the research project and recommends the use of the questions on self-identified ethnicity and descent; these questions are contained in the latest census.

The Committee suggests dissemination of the research findings to relevant National Māori Education organizations and Te Rūnanga o Ngāi Tahu regarding this study.

We wish you every success in your research and the committee also requests a copy of the research findings.

The Ngāi Tahu Research Consultation Committee has membership from:

Te Rūnanga o Ōrākau Incorporated
Kāti Huirapa Runanga Incorporated
Te Rūnanga o Mowaki

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Appendix III- Ethical approval documentation

Professor N Longnecker
Centre for Science Communication
303A Great King Street

Dear Professor Longnecker,

I am writing to confirm for you the status of your proposal entitled “Adolescent Alcohol Education in New Zealand: Impact of a Multimedia Teaching Resource”, which was originally received on May 5, 2015. The Human Ethics Committee’s reference number for this proposal is D15/144.

The above application was Category B and had therefore been considered within the Department or School. The outcome was subsequently reviewed by the University of Otago Human Ethics Committee. The outcome of that consideration was that the proposal was approved.

Approval is for up to three years from the date of HOD approval. If this project has not been completed within three years of this date, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

Mr Gary Witte
Manager, Academic Committees
Tel: 479 8256
Email: gary.witte@otago.ac.nz
Appendix III- Ethical approval documentation

19 June 2015

Professor N Longnecker
Centre for Science Communication
303A Great King Street

Dear Professor Longnecker,

I am writing to let you know that, at its recent meeting, the Ethics Committee considered your proposal entitled "Adolescent Alcohol Education in New Zealand - Impact of a Multimedia Teaching Resource".

As a result of that consideration, the current status of your proposal is:- **Conditional Approval**

For your future reference, the Ethics Committee’s reference code for this project is:- **15/093**.

The comments and views expressed by the Ethics Committee concerning your proposal are as follows:-

Please address the following comments before proceeding with the research:

The Committee asks for clarification as to whether Professor Jennie Connor has reviewed your response to her review of the study.

The Committee understands that you have asked Professor Doug Sellman for comment on the study. Please provide the Committee with Professor Sellman’s comments alongside your response to any recommended changes.

The Committee asks that the Information Sheet for Parents includes a link to the video resource rather than asking parents to approach Shanti Campbell, the student researcher, to view the material.

The Committee asks that the Information Sheets are fully proof read for typing errors and suggests that the word “vomit”; is used rather than “regurgitation”.

S. Campbell
Appendix III- Ethical approval documentation

Before approval of the research to proceed can be granted, a response must be received addressing the issues raised above. The Committee expects that these comments will be addressed before recruitment of participants begins. Please note that the Committee is always willing to enter into dialogue with applicants over the points made. There may be information that has not been made available to the Committee, or aspects of the research may not have been fully understood. Please provide the Committee with copies of the updated documents, if changes have been necessary.

Yours sincerely,

Mr Gary Witte
Manager, Academic Committees
Tel: 479 6256
Email: gary.witte@otago.ac.nz

c.c. Professor L S Davis  Director  Centre for Science Communication
Appendix III- Ethical approval documentation

15/093

1 July 2015

Professor N Longnecker
Centre for Science Communication
303A Great King Street

Dear Professor Longnecker,

I am again writing to you concerning your proposal entitled “Adolescent Alcohol Education in New Zealand - Impact of a Multimedia Teaching Resource”, Ethics Committee reference number 15/093.

Thank you for your response of 25th June 2015 addressing the issues raised by the Committee.

On the basis of this response, I am pleased to confirm that the proposal now has full ethical approval to proceed.

Approval is for up to three years from the date of this letter. If this project has not been completed within three years from the date of this letter, re-approval must be requested. If the nature, consent, location, procedures or personnel of your approved application change, please advise me in writing.

Yours sincerely,

Mr Gary Witte
Manager, Academic Committees
Tel: 479 8256
Email: gary.witte@otago.ac.nz

C.c. Professor L S Davis Director Centre for Science Communication

S. Campbell
We are happy to answer your questions.

Directly phone us at 0123-456789. We will be in touch as soon as possible.

If you want to leave your email address, we will respond to your query.

The purpose of this document is to inform you about the ethical considerations associated with this research.

Who is funding the research?

Funding comes from the Research Grant. We will fulfill all ethical considerations. You can contact us at 0123-456789.

We will brief you on the ethical procedures. If you have any questions, please contact us at 0123-456789.

This research is approved by the University of Science.

INFORMATION SHEET

RESOURCES

MULTIMEDIA SCHOOL EDUCATION

TESTING THE IMPACT OF A BOOZE ON YOUR BRAIN

Appendix III - Ethical approval documentation

S. Campbell

MScComm
Appendix III - Ethical approval documentation

When will I be informed of changes to my child’s treatment?

Your child’s treatment will be reviewed regularly by your child’s clinical team and changed to other treatments when indicated. If you are informed of a change in your child’s treatment, the new treatment will be explained to you and you will be told how the new treatment will be different from the previous treatment. If you have any questions about the new treatment, please discuss these with your child’s clinical team.

What will my child experience while on the study?

Your child’s participation in the study will involve attending regular appointments at the study site. Your child will be accompanied by their parent/guardian during these appointments. Your child will be encouraged to participate in the study but may choose not to participate at any time. If your child chooses not to participate, they will not be required to continue in the study.

For more information, please contact your child’s clinical team.

S. Campbell
MScicomm
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### Open-ended question: Examples of Informational content themed recorded responses from the Traditional Resource.

<table>
<thead>
<tr>
<th>Example responses regarding the informational content of the traditional resource from students.</th>
<th> </th>
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<tbody>
<tr>
<td>I thought that this resource was good because it told me stuff that I didn’t know about alcohol before and now I’m aware of the effects that it can have on my brain and me.</td>
<td>I thought it was pretty good!! Because not only did I learn a bit more on how the brain works with alcohol, but also the steps and everything.</td>
</tr>
<tr>
<td>It was very helpful and informative. I liked how it showed the different stages of drinking and the effects it performed on our brains. I think that some of the bigger words should be explained more just in case some don’t understand the meanings.</td>
<td>It was easy and I got to learn about how alcohol affects the brain.</td>
</tr>
<tr>
<td>I learnt a lot about how alcohol can affect you, and that it’s a lot more dangerous than you think it is. I liked learning about what it can do to your brain and the stages that you go through for drinking. I didn’t dislike anything about it.</td>
<td>There was information I found interesting and also information I didn’t know.</td>
</tr>
<tr>
<td>I learnt new things about how alcohol can affect your brain.</td>
<td>I liked the simple facts and the easy to read information on alcohol.</td>
</tr>
<tr>
<td>I think it was great. It’s good knowing what could happen if you go to over board with drinking alcohol and how dangerous it can really be. It’s very educational and I thoroughly enjoyed finding out all this information.</td>
<td>I liked that it made us more aware of the different stages of intoxication and what are the risks involved. Maybe there should have been a part on whether the people around us drink much alcohol. Then you could know if that effects how much we drink.</td>
</tr>
<tr>
<td>I liked the whole resource, it was interesting and I learnt a bit of new stuff about alcohol.</td>
<td>I liked how the resource gave me more about information about alcohol than I already know about alcohol.</td>
</tr>
<tr>
<td>I think it was a good source of information.</td>
<td>I felt I learnt a lot more about consuming alcohol and how bad it is for you, I now know the 5 steps of drinking and when to stop and what to do when your feeling too intoxicated.</td>
</tr>
<tr>
<td>I liked to learn more about what’s happening to us while drinking alcohol.</td>
<td>This test helped a lot and made me understand a lot more about alcohol than I did, really organised and made me realise how dangerous alcohol really is.</td>
</tr>
<tr>
<td>This test was very interesting and helped a lot with finding out more about what alcohol could really do to our bodies and if I hadn’t read it I wouldn’t have known any of those facts.</td>
<td> </td>
</tr>
</tbody>
</table>
### Appendix IV- Open-ended question themed responses

<table>
<thead>
<tr>
<th><strong>Open-ended question: Examples of Informational content themed recorded responses from the Multimedia Resource.</strong></th>
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<tbody>
<tr>
<td><strong>Example responses regarding the informational content of the Multimedia resource from students.</strong></td>
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I liked it, I now know more about alcohol but it was kind of boring.

It was helpful as it taught me multiple things I did not know about alcohol and it’s effects on the brain, especially towards younger people.

Boring, but informative and I could remember most of the information for now, but possibly won’t remember too much later on.

The resource helped me understand what are the issues of drinking and how many there are. It also helped me to understand how the body deals with intoxication and that there are different stages to intoxication.

Very informative, Good information on the stages of the brain while drinking.

I liked that the information wasn’t biased and told you exactly what happens when you drink.

I didn’t know much, but it was good to find all this stuff out.

It teaches the binge drinkers what all this repeated drinking is really doing to their brain and hopefully caused some of the to stop drinking entirely.

I really enjoyed learning about it.

I think the resource was well laid out and had the perfect amount of information.

Gave straight up facts. I have no opinion on it.

It was good and taught people about the risks of drinking and when you should stop.

I think it gave good information that I didn’t know before. I didn’t know that alcohol could have so many negative affects on the brain and can even be very dangerous for your life.
<table>
<thead>
<tr>
<th>S. Campbell</th>
</tr>
</thead>
<tbody>
<tr>
<td>It was quite interesting to know about all of the things that your body goes through under the influence of alcohol. There wasn’t really anything bad about the resource.</td>
</tr>
<tr>
<td>It was all right, and surprised me on what the effect of alcohol can be.</td>
</tr>
<tr>
<td>It was a good way to learn about the effects of alcohol consumption. I liked watching the videos and the text and Teri’s journal entries were a good way to continue to get the message across.</td>
</tr>
<tr>
<td>I liked this survey and think that it is a good way to teach youth about the harmful affects that alcohol can have on the body.</td>
</tr>
<tr>
<td>I enjoy this resource, it was good it worked well and helped me learn lots of new stuff. It was good that there were different options to choose from.</td>
</tr>
<tr>
<td>I really liked it and learnt new things I didn’t know before.</td>
</tr>
<tr>
<td>I did like this resource, I definitely found that it helped my understanding of drinking.</td>
</tr>
<tr>
<td>I liked that it had a lot of facts that could help people with their drinking and that what drinking does to your body, such as causing you to go into a coma etc.</td>
</tr>
<tr>
<td>I think this resource gives good information about the effects of alcohol. It had some stuff I wasn’t expecting so it was surprising.</td>
</tr>
<tr>
<td>I like the way they explained the use of alcohol because it wasn’t boring and you could pick out of which three you wanted to choose from.</td>
</tr>
<tr>
<td>It is and will be a good way to find out more about the underage-drinking ratio.</td>
</tr>
<tr>
<td>I quite liked the resource and it was very informative and the information was set out in an easy read way.</td>
</tr>
<tr>
<td>I think it was interesting reading about the information and how alcohol can affect your brain.</td>
</tr>
<tr>
<td>Good, had lots of information and all information was clear.</td>
</tr>
<tr>
<td>I think it was very good and certainly made me aware of the causes that alcohol do to your brain and how they affect your thinking and actions.</td>
</tr>
<tr>
<td>It was good because it gave me a good understanding of the causes of alcohol and the long-term effects.</td>
</tr>
<tr>
<td>It was extremely good to actually learn what your brain is doing or thinking.</td>
</tr>
<tr>
<td>I liked it, I don't drink for many reasons and I think that all minors should be educated about this.</td>
</tr>
<tr>
<td>I liked everything about this resource, about how it tells you all the common symptoms that can occur and how badly it affects your own brain.</td>
</tr>
<tr>
<td>It was informative and I enjoyed it</td>
</tr>
<tr>
<td>I liked how they told a lot of facts and showed the symptoms of drinking alcohol in small but effective clips.</td>
</tr>
<tr>
<td>I like the resource. It is informative and has taught me about the use of alcohol.</td>
</tr>
</tbody>
</table>
It was good because now people that drink they will know what is going to happen to them while and after they drink.

It was good and informative. I learnt that drinking damages your brain.

I thought it was good and some of those videos were very informative as to why it isn’t safe to drink high amounts of alcohol.

It was great and I learnt a lot about the brain.

It was helpful in making us aware of the stages of drinking and the effects of having too much alcohol.

I liked that it was informative and gave me straight facts.

I thought it was good, and that it’s important that teens know about some of the ill effects/consequences of binge drinking before they're absorbed into that culture.

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Appendix IV- Open-ended question themed responses

**Open-ended question: Examples of content delivery themed recorded responses from the traditional resource.**

<table>
<thead>
<tr>
<th>Responses regarding the content delivery of the traditional resource.</th>
<th>I liked how they had diagrams to show what they were explaining about and how they showed the 5 processes you should or may go through when drinking alcohol.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>It’s good, although I noticed the other one had videos, which would have been good. Also more photos/diagrams would have been good as well. But overall very well done and written. Learnt things.</td>
</tr>
<tr>
<td>I thought it was good. There was quite a lot of writing. Maybe their needed to be more diagrams or pictures but overall pretty good.</td>
<td></td>
</tr>
<tr>
<td>I found it interesting and boring reading about it.</td>
<td></td>
</tr>
<tr>
<td>I think that that it might need some more pictures to help explain how it works, but also explain the hangover a bit more so it is easier to understand what it does to the body.</td>
<td></td>
</tr>
<tr>
<td>It was fine, not too much reading to the point that it was boring. It was very informative. There was too much writing.</td>
<td></td>
</tr>
<tr>
<td>It was okay I guess, I liked that there was a questionnaire before and after and I disliked the reading, as I don’t pick up information well from written words. I find it easier when learned from another person or by a resource e.g. Documentary.</td>
<td></td>
</tr>
<tr>
<td>The pictures were good, but the text was a bit boring. I found myself zoning out a bit while reading.</td>
<td></td>
</tr>
<tr>
<td>Boring, would rather a video. Didn’t get stuck into the topic.</td>
<td></td>
</tr>
<tr>
<td>I think that it was good because I learnt a lot, but it was quit a lot to read.</td>
<td></td>
</tr>
<tr>
<td>I think the resource was all right. I learnt some new stuff, but what I didn’t like is how there was no video’s. There were pictures that you could look at so that’s another positive.</td>
<td></td>
</tr>
<tr>
<td>It would be better on paper its hard to control on computer.</td>
<td></td>
</tr>
<tr>
<td>Too many words.</td>
<td></td>
</tr>
</tbody>
</table>
This resource was an interesting one because I learnt a lot about alcohol and the effects of it on the brain. I liked how there were pictures to help us gain an understanding on the topic.

For me the amount of reading required began to get boring so I would add some videos or cartoons etc. Overall it was fine.

The information was nice and simple and the pictures were good. The length of it was good because if it had been any longer I would have started to get bored. It was good information and it was interesting instead of it just telling you not to drink you learn the effects instead.

I liked it. There was a good amount of writing. If there were anymore I probably wouldn’t remember as much.

I liked how the resource was written but just reading percentages and descriptions did make it difficult for the information to be learnt and remembered. I tend to skim a lot when reading on a computer and it may have been better to have it in a book format or printed out if that’s possible. I think that it would also have been good to have a small bullet-pointed summary of everything towards the end of the resource to recap on everything that was just learnt.

It was okay it might have been more effective if it had videos to show us the different stages it drinking.

It was good but I would rather do PE than sit at a computer having to read about drinking, so you should make a video so I don’t have to read.

It was too long to read.

I liked the pictures that where with the information. It helped give me a much clearer picture of what was being said in the words and emphasised the effects that alcohol had on the brain because I was able to see what happens and which part it effects.

I liked that it had a lot or information that I wasn’t aware of and I didn’t like how there was lots to read I think it was too much information to remember.

I think that this resource was good because it was straight to the point and didn’t bother with unneeded colours and sounds.

It was good, although a bit uneasy to remember things because you have all these words to read and the important ones get washed away in them. I could remember a few, but that was because they were more clearly stated than others, the others were lost inside the words. I liked the pictures describing what where the things were happening. All in all, it was good although there was a bit too much reading and the important points kind of got lost in translation.

I thought there was a lot of reading, but I enjoyed it.

The information was short but well described. The pictures were clear and easy to read.

I found this really good. Maybe more pictures?

The resource was helpful and I liked the visuals e.g. the brain diagram indicating where that part is. It deepened my understanding of the text. The text did get a bit uninteresting at times and I did not understand some parts, but overall it was good.
Too much reading hurt my eyes (I don’t wear glasses and I like reading).

Different sections helped as well as the pictures. Complicated words were explained pretty well but examples should have been included. It was good that it wasn’t opinionated. There should have been more pictures or short clips to demonstrate points. There should have been a section about alcohol consumption in New Zealand. Overall, good information and points were covered well.

The tests weren’t really long so I didn’t lose concentration too quickly, but some of the reading paragraphs were quite long and so I found myself not focusing after a while.

I thought it was good. It was easy to read/understand. Maybe could have more photos/diagrams to help us understand/remember easier.

I found that the information was easy to understand and the information wasn’t all packed in to one place, but spread out evenly. A very nice lay out.

I liked how it wasn't hard to read, but I would have preferred to watch a video or listen to someone explain it.

It was okay, but kind of boring. You could include more people’s stories or experiences instead of just endless facts.

It was very educational, as I learnt stuff about alcohol’s effects on the brain. I do however found it a little boring for a teenager to read the resource and it needs to be written in a form where the younger generation can understand it too. I did enjoy this survey though. It has broadened my horizons when it comes to the consumption of alcohol.

I liked this resource because the website was easy to use and it was nice and clear. I didn’t like how there were some paragraphs that didn’t have pictures and they were the really long ones. I think that the resource should be made more relatable to teenagers. Most teenagers can’t relate to facts about alcohol but if you tell a story about what happened to someone while drinking, it might make them listen more.

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**Appendix IV- Open-ended question themed responses**

<table>
<thead>
<tr>
<th>Open-ended question: Examples of multimedia and narrative themed recorded responses from the multimedia resource.</th>
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</thead>
<tbody>
<tr>
<td>Responses regarding the multimedia and narrative components of the resource.</td>
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<tr>
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</tbody>
</table>
wasn’t a huge fan of the photos because I didn’t get too much information from them.

I liked the videos with new music to make it more interesting. It was helpful to play the narration while reading the text at the same time. The videos were really good to remember facts when it showed the words on the screen, a picture of what it was talking about, and Teri reading it because it was easier to picture in your brain when you were remembering the facts for the exit test. The narration clip was quite boring because I felt my mind wander to other thoughts and not focus, as there was nothing to look at.

I liked hearing Teri’s story.

It was interesting. I liked the videos, not the reading, as it was easier to follow with examples.

It was a great way of learning. Being able to see and hear what I am learning helps me retain information. I don’t think the video diary was needed, but other than that the videos were great.

I disliked listening to the audio, as I am not a good listener.

I liked how I didn’t have to read pages of information. I could just watch and listen.

I thought it was good with relating to this generation and the facts were easy to read and weren’t presented in a boring way. The use of different ways to get the facts out was very helpful and helped me understand better.

I thought it was good there were videos. I think teens these days would prefer watching a video than reading paragraphs of text. I feel as though in a video you can see the picture as well, unlike with the text different minds can create a different image.

The story/videos were really cool because they enabled us to get a visual of what could happen if you drink too much alcohol. Plus the girl talking while we watched helped me/us to understand what was going on at the same time.

I liked the videos because you got to see what it looked like. The text was good to reinforce the videos, although I didn’t use it too much. I really liked the animations too, as then you got to see where in your body alcohol would affect.

Videos helped allot if there wasn’t videos I would’ve lost interest real quick.

Very good, I didn’t get bored due to the videos and even the narration.

I like how the resource was broken down and was easily understandable. The diagrams by the side of the text were quite helpful and interesting. It was also quite useful and interesting to have someone who was going through the effects of alcohol tell us the facts, and to see them go through it.

The journal entry was good because it showed exactly how she felt before during and after alcohol consumption and the facts told us why.

The videos and diagrams clearly showed what was happening. Also having someone saying how they felt showed us the effect alcohol
could have on your behaviour and state of mind.
I like how it gives you an option to watch, listen or read, this means that people can choose what they think is best for them.
I liked the video clips and Teri’s story. I found the images were really useful.
It was very good to have a video that explained everything. It made it a lot easier to understand and interpret. It was definitely better than having to read everything, but it was good to be able to do that if you wanted.
I liked the way the journal entries were made and also the rest of the video.
The video clips were good but the reading was more boring.
It was a creative way to present it, which I enjoyed.
I liked the videos because they made it interesting to watch and easier to remember. I also liked how there was the option of watching, listening or reading because after watching the videos I would skim through the reading and read the key points or parts I missed.
I thought it was really well done, because it had many things you could do to get the information and it wasn't in a boring way.
I liked Teri’s facts and her videos
Yes I did like the resource especially the videos, as that really interested me.
I liked the journal videos but I felt there was too much text.
I like Teri’s video diary’s as it was like there was a personal touch to it.
I like they animations, choice of music soundtrack and use of diagrams and giving options of reading, watching or listening to the information.
It was good I like the videos and how it showed actual people so we could relate to them.
The acted out things made it more realistic and relatable to life.
I liked the story while they were drinking it helped me think about the stages of drinking. I wish it went more into depth about the story, like showed the whole night. But other than that I think this is awesome :)
I like how it showed a story of what actually happens to people in real life and how it wasn’t all just reading and when there was reading there was a soundtrack to go with it. I didn’t dislike anything about this.
I liked the videos because it was a more realistic representation of what the effects of drinking alcohol are. But I think there could have been less really short individual videos and made it into one big video.
I liked how it followed Teri’s story of that night. I disliked the use of some photos.
The journal clips helped me look at this from the perception of someone who was in this situation.
I really liked watching the video clips and the story, it really helped explain the information and then having the text if I missed a bit or wanted to read a fact to help remember it. I liked having the different ways of learning the information so you could choose what you preferred.

Appendix IV- Open-ended question themed responses

<table>
<thead>
<tr>
<th>Responses regarding the resource evaluation of the traditional resource.</th>
<th>Open-ended question: Examples of resource evaluation themed recorded responses from the traditional resource.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like this because you’re telling the truth.</td>
<td>I like this because you’re telling the truth.</td>
</tr>
<tr>
<td>Informative and thought provoking.</td>
<td>Informative and thought provoking.</td>
</tr>
<tr>
<td>It was okay, some parts I didn't understand.</td>
<td>It was okay, some parts I didn't understand.</td>
</tr>
<tr>
<td>I think it was really good because it was easy to read and I learnt quite a few new things. I think all students should have to do this throughout New Zealand.</td>
<td>I think it was really good because it was easy to read and I learnt quite a few new things. I think all students should have to do this throughout New Zealand.</td>
</tr>
<tr>
<td>It was helpful. Not really phased.</td>
<td>It was helpful. Not really phased.</td>
</tr>
<tr>
<td>It was easy to understand and taught me a lot although I couldn't quite remember everything.</td>
<td>It was easy to understand and taught me a lot although I couldn't quite remember everything.</td>
</tr>
<tr>
<td>It was okay it was a bit boring, but I found out a few new things so I liked that.</td>
<td>It was okay it was a bit boring, but I found out a few new things so I liked that.</td>
</tr>
<tr>
<td>It was informative, but a little boring.</td>
<td>It was informative, but a little boring.</td>
</tr>
<tr>
<td>This resource was very informational and helpful. It supplies good facts about the effects of alcohol and what it can do to your body, and makes you really think about what alcohol actually does. More people should learn about this in schools for future references.</td>
<td>This resource was very informational and helpful. It supplies good facts about the effects of alcohol and what it can do to your body, and makes you really think about what alcohol actually does. More people should learn about this in schools for future references.</td>
</tr>
<tr>
<td>I thought it was interesting. I liked it because I learnt something from it and saw my own differences in the answers from my first test and the last one. I disliked it because it was a bit boring just reading because information that I read didn't really sink in.</td>
<td>I thought it was interesting. I liked it because I learnt something from it and saw my own differences in the answers from my first test and the last one. I disliked it because it was a bit boring just reading because information that I read didn't really sink in.</td>
</tr>
<tr>
<td>I think it's a resource that serves a good purpose. I don't dislike anything about this resource.</td>
<td>I think it's a resource that serves a good purpose. I don't dislike anything about this resource.</td>
</tr>
<tr>
<td>Good way to warn people about the dangers of alcohol and how to help themselves.</td>
<td>Good way to warn people about the dangers of alcohol and how to help themselves.</td>
</tr>
<tr>
<td>On point made me think about my background with my dad.</td>
<td>On point made me think about my background with my dad.</td>
</tr>
<tr>
<td>It was hard because I’m dumb.</td>
<td>It was hard because I’m dumb.</td>
</tr>
<tr>
<td>Effective and to the point, no dislikes.</td>
<td>Effective and to the point, no dislikes.</td>
</tr>
<tr>
<td>I liked how there were a variety of questions and answers to choose from. I also liked how you considered those who don't drink and you left a space from them to tick. I liked how this can teach some people to rethink things about their drinking if they do drink and the consequences of those decisions and making them aware of what could or is happening.</td>
<td>I liked how there were a variety of questions and answers to choose from. I also liked how you considered those who don't drink and you left a space from them to tick. I liked how this can teach some people to rethink things about their drinking if they do drink and the consequences of those decisions and making them aware of what could or is happening.</td>
</tr>
<tr>
<td>Factual but a bit boring.</td>
<td>Factual but a bit boring.</td>
</tr>
<tr>
<td>It was educational. It was fine.</td>
<td>It was educational. It was fine.</td>
</tr>
<tr>
<td>Informative, kind of boring though.</td>
<td>Informative, kind of boring though.</td>
</tr>
<tr>
<td>The resource provided was informational but not very interesting</td>
<td>The resource provided was informational but not very interesting</td>
</tr>
</tbody>
</table>
and hard to concentrate on.

I like the idea, and how you are making us more aware of what alcohol can do and how you included some tips for drinking.

It was boring.

Very boring and I found it was really hard to concentrate, I usually have a good memory but I found this so boring I tuned out a bit. I did however find some of it interesting and the pictures were helpful.

I thought it had a lot of good information to help everyone about being safe when drinking alcohol. Also I thought the tips at the end were very good. The different stages of what happened when you drink alcohol were helpful. I think that some of the words were difficult to understand if they had more meaning. Overall a good resource!

The questions were very clear and easy to read. The resources were easy to read and understand and having them separated into the different categories made it easier to take in the information and associate it with the different questions. Overall, it was very straightforward :)

I liked how informative it is, as it seems like a very useful resource for people growing up and may deter younger people from binge drinking at a young age. There is nothing I really dislike about this as it serves its purpose and delivers interesting info at the same time.

I think this was a really good resource as it opened up your mind and you now know the symptoms and effects this has on the body. They need to do this more often to people get the message.

I think it was a good resource. I liked that we had a test on what we knew and then got another test on what we had learnt.

I liked about reading new information and I think it was a good time to start teach this at this age so we no what we are getting into.

I liked that I learnt new things about alcohol that I didn't know before, I like that we do this in year 10 because people my age tend to go out to parties and get real drunk.

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Appendix IV- Open-ended question themed responses

<table>
<thead>
<tr>
<th>Open-ended question: Examples of resource evaluation themed recorded responses from the Multimedia Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses regarding the resource evaluation of the multimedia resource</td>
</tr>
<tr>
<td>I found this resource very helpful, I have learnt a lot that I didn't know before taking the resource, and I enjoyed the resource very much.</td>
</tr>
<tr>
<td>It was alright some boring parts but overall good</td>
</tr>
<tr>
<td>It was good, it took awhile but it was good.</td>
</tr>
<tr>
<td>I think that this resource is very informative and helpful. The videos and audio tracks are a good touch, they kept me focused and engaged. All the questions were good and appropriate for people my age. This survey should be released around New Zealand</td>
</tr>
<tr>
<td>I really liked it and I don't think you should change it.</td>
</tr>
<tr>
<td>I enjoyed this resource as I learnt quite a bit.</td>
</tr>
</tbody>
</table>
Appendix IV- Open-ended question themed responses

<table>
<thead>
<tr>
<th>Open-ended question: Examples of future behavioural intentions themed recorded responses from the Traditional Resource.</th>
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</thead>
<tbody>
<tr>
<td><strong>Responses regarding future behavioural intentions of students after exposure to the traditional resource.</strong></td>
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</tbody>
</table>
It was good I learnt a lot of new stuff that I didn’t know and it helped me even though I don’t drink. I have only had a few sips. I will know what will happen to me when I do drink if I ever do.

I liked this resource because it gave us a better insight on how alcohol impacts our brain, and that it holds long term effects and can seriously damage our systems. I feel like I know more about alcohol usage, and if there is a time where I do drink, I’ll know how to handle it.

It was pretty good because it taught me more about alcohol, what it does to the body, why it is bad to start young and how to drink responsibly.

I think this is a good resource for informing people of the very negative affects of alcohol on the brain. It is all very clearly laid out and is easy to understand. This will all be taken into consideration IF I ever go to drink alcohol, or if anyone around me is considering it.

Yes, it did help me learn a little more and I am now aware of the affects alcohol has on the brain etc. But I would still have a few drinks with my mates but will take precaution. They’s could’ve been a little more positive effects about alcohol but I understand that you’re trying to teach us a valuable lesson for the future.

I liked the resource it had a lot of information about what can happen if you drink. It is good because it makes you not want to drink until you are older.

It was very informational and I learnt a lot. Should help me in the future when I make decisions.

I like this resource very much because I learnt a lot about alcohol and that I should be very smart around alcohol and it makes me think about my future and what alcohol can do to me and what it can do to change in my life. Thank you :)

Appendix IV- Open-ended question themed responses

<table>
<thead>
<tr>
<th>Open-ended question: Examples of future behavioural intentions themed recorded responses from the Multimedia Resource.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses regarding future behavioural intentions of students after exposure to the multimedia resource.</td>
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take it all in and maybe consider slowing down or finding something instead of drinking ;]

The resource was good it showed me the long-term affects that beer has on your body. I now know too think before having more drinks.

Really interesting and made me re-think about how dangerous alcohol can be.

This resource is very useful and it shows what actually happens when you drink too much. I feel more informed of the dangers of alcohol and will be very cautious and careful when I decide to start drinking.

I like the fact that it follows a general storyline of what mainly happens in NZ when you are at university and just warns us of what may come if we drink too much.

Helped me think more about drinking.

It was pretty good but I still don’t think it’s enough to make me stop, as it does become more of a need then want.

This is a good resource but in the future I’m still going to drink as much as I do haha.

I liked it cause it was helpful about teaching me the affects of alcohol when drunk, it may slow down my drinking if I do in the future.