Enabling in-car location-based experiential learning with Presentria GO

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Abstract: The COVID-19 pandemic has changed how millions around the globe are educated. The 2nd or 3rd waves of the disease have made learning in classrooms unsafe once again. Many schools are forced to send their students home to take online classes under their government's lock-down protocols. For many young learners, engaging with school is a significant part of their well-being, which has been compromised by the extended period of remote learning and low social interaction levels during the pandemic. New and innovative solutions to address learners' needs have been called during this pandemic. The Presentria GO system is an innovative solution that enables students from K-12 to higher education to learn experientially from their cars during a city excursion. Through a survey with 74 educators and a series of expert interviews and focus group discussions, insights into the feasibility of this active learning mode are explored. This paper proposes the concept of 'in-car location-based experiential learning' as one of the methods to engage students during the pandemic and beyond.

Keywords: active learning; experiential learning; in-car learning; mobile learning; location-based learning.

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1 The call for innovation in education delivery

The Coronavirus (COVID-19) pandemic has reshaped the education industry and changed how millions around the globe are educated. As the pandemic continues to spread globally, learning in classrooms can be viewed as unsafe and risky. Many schools are forced to send their students home to take online classes under their government's lock-down protocols. According to UNESCO, nationwide school closures were implemented in 163 countries during the pandemic's peak in summer 2020. Such closures affected 1.16 billion students, representing 66.4% of the world's totalled enrolled students (UNESCO, 2020).

Online learning has become the new normal for many people, whether they are studying at K-12, college, or university levels. A growing number of extracurricular activities that used to be taught face-to-face are now being made available to students online. However, psychologists have pointed out that constant video chat over webinars drains people more than in-person conversations (Daigle, 2020). Educators have to find alternative ways to reduce the amount of "Zoom fatigue" their students face and make learning fun once again. The World Economic Forum argues that the COVID-19 pandemic has become a catalyst for educators to search for innovative teaching approaches and make changes for the better in the long run (Tam and El-Azar, 2020).

2 Transitioning from traditional lecture to experiential learning

For centuries, educators have been using a lecture-based approach to teach students in classrooms. As education evolves, the concept of active learning has been embraced by educators to promote higher-order thinking skills through discussions, case studies, role-plays, experiential learning, and other methods (Bonwell and Eison, 1991; Bonwell and Sutherland, 1996; Kolb, 2015; Queens University, 2020). Experiential education is a hands-on form of learning and transforms students from passive receivers to active learners (Wang et al., 2009). Unlike traditional lectures, it involves abstract thinking, observation and reflection, adventure and challenge, and application to life (Association for Experiential Education, 2020).

Experiential learning has various pedagogical advantages. Students typically remember only a fraction of what they hear from class, but they can remember a lot of what they actively do (Borg and Stranahan, 2002; McLean and Tatnall, 2000; Senge, 1990). Experiential learning makes the student a stakeholder, and the hands-on approach improves their ability to absorb knowledge (Hawtrey, 2007). When students' motivation and commitment to learning are enhanced, they can achieve higher learning performance than passive learners (Senge, 1990; Wood, 2015).

3 Democratising learning to make it accessible anywhere

Nowadays, students are looking for an enhanced learning experience from their schools. In addition to carrying out experiential learning in the classroom, educators can also engage their students outdoor, such as geocaching and observational field trips (Hellgren et al., 2014). The concept of Learning Outside the Classroom (LOtC) is well studied and explored (Hawxwell et al., 2019; Pellegrini and Smith, 1998; Perry, 2001; Waite, 2011). Educators argue that LOtC has a motivating effect on young students and a beneficial impact on their behaviour. They found that young students are twice as engaged and attentive in the classroom following an outdoor learning activity (Briggs, 2018). In the UK, the importance of LOtC is officially recognised by both the government and industry practitioners. Attraction sites that offer educational visits could receive the nationally recognised LOtC Quality Badge if such venues met the schools' learning and risk management needs (Council for Learning Outside the Classroom, n.d.).

Students can learn a lot by addressing issues related to their neighbourhood, town, or community. This is the essence of Place-based Learning in which students are encouraged to go out and solve community problems using their interdisciplinary skills (Ardoin et al., 2012; Knobloch et al., 2020; Peterson, 2018; Sobel, 2005). To maintain students' high-level of interest when learning in the field, educators can enhance the trip using electronic devices that have sensing technologies. Prior research has examined the feasibility of implementing Context-aware Ubiquitous Learning (Hwang et al., 2008, 2011) and Mobile technology-supported in-field learning (Hwang and Wu, 2014).

The development of mobile technologies and the proliferation of smartphones have made context-aware learning possible, releasing students from the time and physical classroom confinement (Johnson et al., 2012; Rogers, 2008; Wang et al., 2009). In mobile learning, students can situate themselves in the field that embraces real and digital learning information (Hwang et al., 2018). Mobile learning is the future developmental trend in the education field (Sun and Chang, 2016), as it allows students to learn, play or engage anytime and in any location (Oliver, 2017). As pointed out by Song et al. (2011), effective integration of context – the physical environment and students' continuous changing cognitive interests – is essential for mobile learning. Prior research has demonstrated a positive impact on students' learning achievement when context-aware learning is supplemented by using mobile devices in the field (Chang et al., 2011; Hwang et al., 2011, 2008).

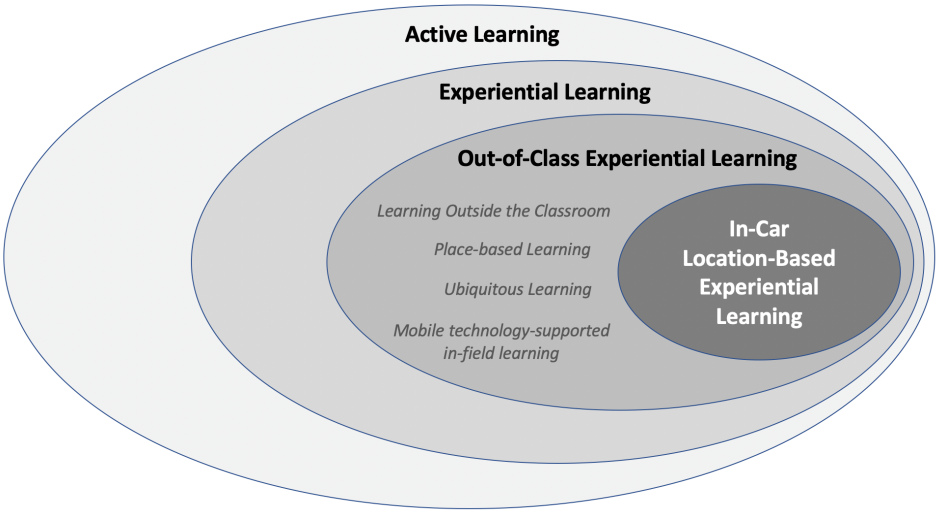
4 New ways to work, live and learn during the pandemic and beyond

The unprecedented COVID-19 pandemic in 2020 has affected all walks of life in our society. As governments impose strict restrictions to contain this deadly coronavirus's spread, organisations are forced to develop new ways to entice customers. The pandemic has allowed us to find innovative ways to work, play, and learn under the new normal. In Japan, the Tomiuriland theme park in western Tokyo suburbs was selling day passes to allow people to work privately in its Wi-Fi-enabled Ferris wheel gondolas up in the air (Marcus, 2020). Over in Central Europe, a Michelin-starred restaurant in Hungary served fine-dining in the private Ferris Wheel gondolas at the Budapest Eye (Thiruvengadam, 2020).

Many people feel safe in their cars and consider them a safety bubble during the pandemic (Gawley, 2020). A growing number of isolating workers have turned their vehicles into home offices, especially when many of the latest car models have built-in Wi-Fi connections (Hull, 2020). The need to protect oneself from COVID-19 can also be seen from the increasing popularity of Drive-in movie theaters worldwide; many people prefer to watch their favorite movies safely inside their cars (Hoeller, 2020; Shepert, 2020). In Canada, the Toronto Zoo responded to the pandemic by launching a safari drive-thru, allowing guests to enjoy the zoo from their cars (Collins, 2020). For art lovers in Toronto, they were able to immerse themselves in a drive-thru art exhibition to learn about Vincent van Gogh's creations in the era of physical distancing (Nathoo, 2020).

This paper proposes the concept of "In-Car Location-based Experiential Learning" as a feasible option to address students' learning needs within the Active Learning paradigm (see Figure 1). This type of experiential learning takes place outside of the classroom. Unlike regular field trips, it empowers students to immerse themselves in a socio-cultural context and learn safely inside a car at various checkpoint locations in a city.

Figure 1 In-car location-based experiential learning as a core component in active learning



5 Designing a system for in-car location-based experiential learning

The design of such a system has been influenced by prior research in this area. Five design guiding principles are developed:

5.1 Design guiding principle #1: use of GPS

Hwang et al. (2008) pointed out that location-aware systems increasingly support autonomous learning in various socio-cultural contexts. Since all modern smartphones are well equipped with advanced Global Positioning System (GPS) functionality, the

proposed system should be able to use GPS in conjunction with wireless data (3G/4G-LTE/5G) and Wi-Fi to identify students' location in the field.

5.2 Design guiding principle #2: proximity range adjustment

The usability of the location-based application is affected by many factors. Low GPS sensor performance, large physical obstacles (e.g., tall buildings), and poor weather conditions (e.g., snow) can result in poor GPS reception, negatively affecting the location-based application's performance (Hoffman, 2013). The proposed system should have the flexibility to allow educators to adjust the proximity range so it can capture students' location properly during the field trip.

5.3 Design guiding principle #3: relevant and media-rich content

Educators can utilise mobile carrier's high-speed data network to deliver relevant content to students' smartphones based on their location. Shang et al. (2011) hinted at the relevant content that can display remotely on students' smartphones. In their research, the authors argue that text information, pictures, videos and other interactive capabilities can significantly improve the user's experience during their sightseeing routes. Our proposed system should have the capability to deliver relevant and media-rich content remotely.

5.4 Design guiding principle #4: gamification

The next design guiding principle is drawn from the concept of gamification – the process of game-thinking and game mechanics to engage users and solve problems (Zichermann and Cunningham, 2011). Specifically, our proposed system should be interactive, attention-grabbing, and have the ability to provide real-time feedback (Rackwitz, 2014). It should also include well-designed challenge levels to show students' progress as they develop a more complex understanding of the content and gain points (Pappas, 2015; Shute and Torres, 2012).

5.5 Design guiding principle #5: assessments

Another consideration in system design is related to assessment. As suggested by Rapti (2013), a properly designed game that engages students, motivates action, promotes learning and solves problems can be used as an alternative way of assessing students. The proposed system should include formative assessment such as multiple-choice questions with auto-grading capability.

6 In-car learning with Presentria GO

The Presentria GO[1] system is adopted to facilitate In-Car Location-based Experiential Learning (ICLEL) because it satisfies the five design guiding principles as mentioned. This experiential learning software is an extension of the widely used uReply class response system that has seen its functionalities expanded over the years

(Lam et al., 2019). Table 1 summarises the design guiding principles and the key functionalities of Presentria GO that makes the concept of In-Car Location-based Experiential Learning possible:

Table 1 Summary of design guiding principles and Presentria GO functionalities

Design guiding principle	*Prior research*	*Presentria GO*
1. Use of GPS	Hwang et al. (2008)	Student's GPS location data is captured and transmitted to the Presentria GO system via wireless data/Wi-Fi. The system will push relevant content to the smartphone based on its location.
2. Proximity range adjustment	Hoffman (2013)	Checkpoint's proximity range can be set from 1 to 500 metres to detect a student's presence in the field.
3. Relevant content	Shang at el. (2011)	Relevant content delivered to the smartphone includes text, picture, YouTube video, PDF file, and questions. Presentria GO supports six question types: multiple-choice, text, fill-in-the-blanks, likert-scale, numerical value and private message.
4. Gamification	Pappas (2015); Rackwitz (2014); Zichermann and Cunningham (2011); Shute and Ke (2012)	Real-time feedback can be shown after a question is answered. The system can give points for questions answered correctly. Also, the educator can set up checkpoint levels to make the trip more challenging.
5. Assessments	Rapti (2013)	The system allows educators to ask multiple-choice questions with auto-grading capability. Educators can view their students' performance online or download the data in spreadsheet format.

This mode of learning brings students outside of the classroom to learn. For example, a college-level retail management professor is interested in teaching the concept of "Click and Collect" service as part of the omni-channel retailing discussion (Wong, 2021). This professor can send their students out to visit different retailers in the city to observe how such service is being arranged and ask them questions while they are in the field. In theory, students can visit these retailers by walking, cycling, taking public transportation, travelling in their cars, or taking a ride-sharing service such as Uber or Lyft.

The first step for the professor is to plan the trip by pinning checkpoints on a digital map in the Presentria GO system and set up the tasks to be performed at each checkpoint (see Figures 2 and 3).

Students are then informed to visit these checkpoint locations by car and park in a safe spot. Once the vehicle is parked safely in the parking lot or on the side of the road, students log into the Presentria GO system using a mobile browser (see Figure 4) to perform the assigned tasks from their cars.

Figure 2 Educators can pin checkpoints on a digital map in the Presentria GO system

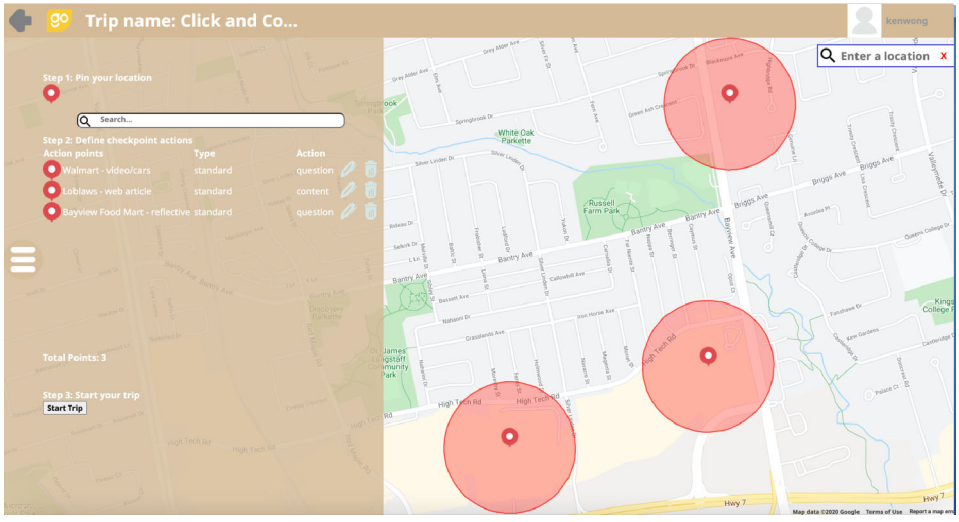
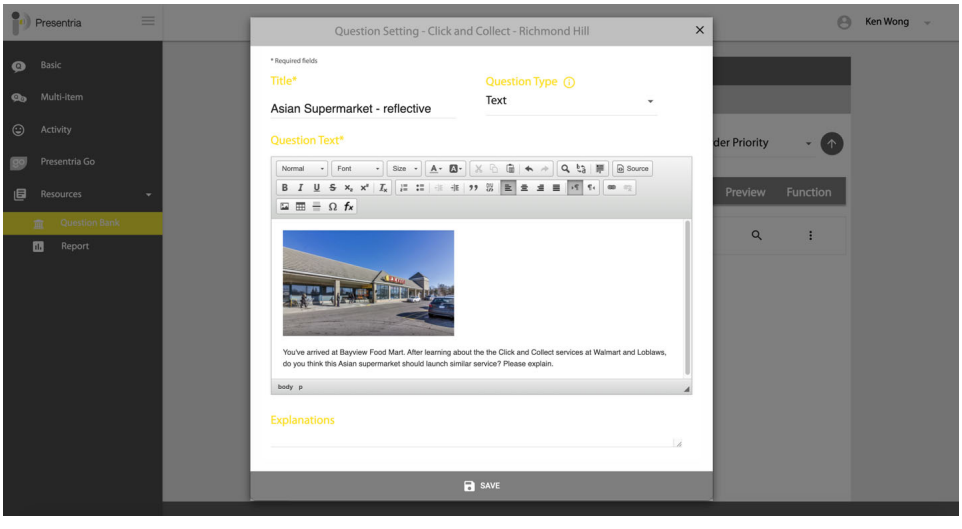


Figure 3 Setting up questions (six question types) using Presentria's built-in WYSIWYG editor



Implementing this kind of location-based learning depends on good GPS reception and wireless data connectivity in the field. Hence, in locations where there are many tall buildings or have poor GPS reception, a broad proximity range (e.g., 200 to 300 metres) is suggested when setting the checkpoints. For this reason, professors should avoid asking students to visit checkpoints that are located indoors, such as retail shops in a multi-level shopping mall.

Once the Presentria GO system has detected the presence of the students within the proximity range, students will first be asked to grant permission to disclose their GPS location for privacy reasons. If Yes, they will be presented with a YouTube video to watch (see Figure 5), a question to answer (see Figure 6), a PDF file to view, or a website

hyperlink to visit. The Presentria GO system supports six different question types. The professor can pin multiple checkpoint actions in the same location for students to tackle (see Figure 7).

Figure 4 Student logs into the Presentria GO system using a mobile browser when he or she arrives at the checkpoint location

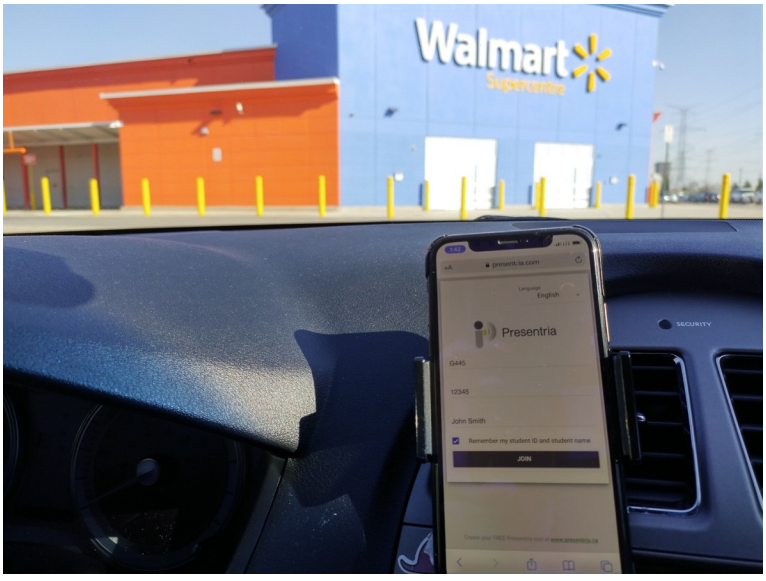
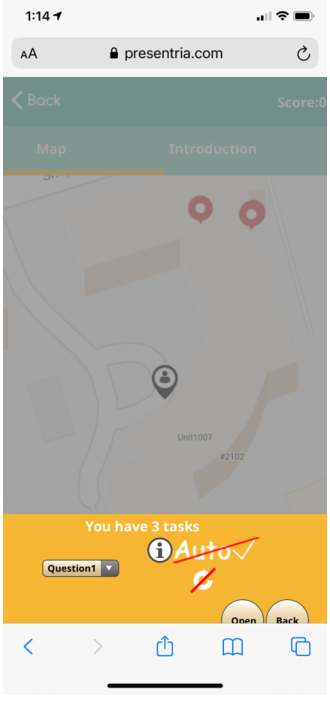


Figure 5 YouTube video

Figure 6 Text question

Figure 7 Multiple tasks in a checkpoint location



When students drive to the next checkpoint, Presentria GO will show another set of tasks on students' mobile devices. It can display general information or tips at each checkpoint to guide the students during the field trip (see Figure 8). Similar to traditional geocaching outdoor activity, students can only discover the "content" or "caches" when they physically visit these locations. This learning mode encourages students to explore the city and immerse themselves in the environment throughout their learning journey. Gamification elements such as scores, feedbacks, levels, and rewards can be incorporated into this experiential learning experience. For example, students can compete among themselves by scoring points after correctly answered Multiple-Choice (MC) questions at these checkpoints (see Figure 9). Feedback can be given to the students immediately right after submitting the answers (see Figure 10).

Figure 8 General information

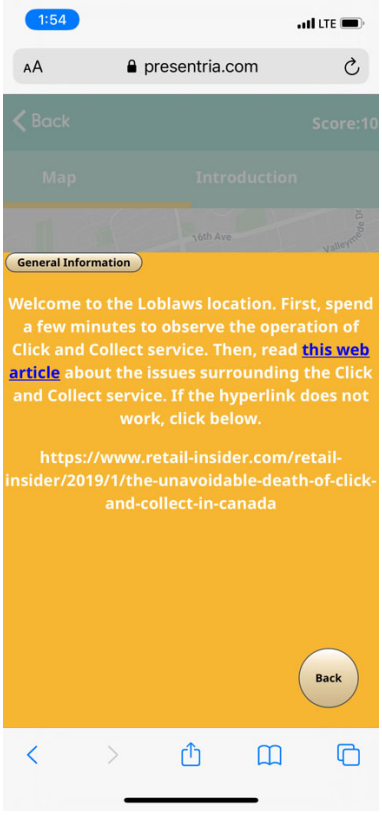


Figure 9 Scoring points at checkpoints

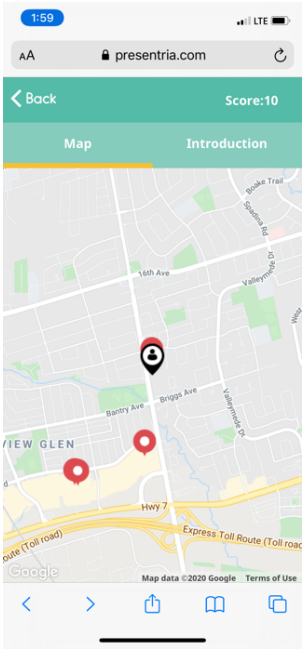
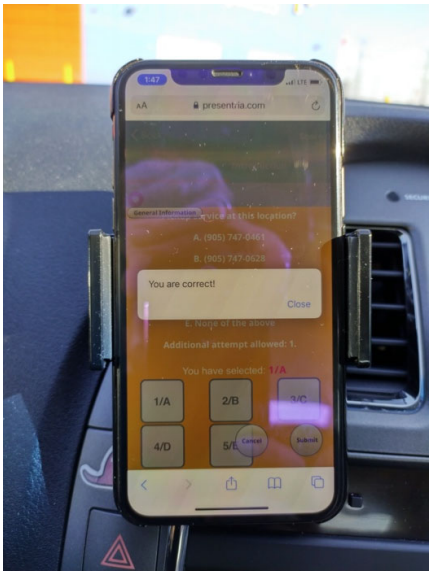


Figure 10 Immediate feedback



At the last checkpoint, the professor can ask students to evaluate their trip experience on a likert-scale question. Furthermore, a certificate of completion PDF can be sent as an acknowledgement to those students who have completed their trip successfully (see Figure 11).

Figure 11 Certificate of completion (PDF)

Students' trip performance and ranking (based on points scored) can be viewed on the Presentria GO "Trip Management" web interface after the trip is ended (see Figure 12). The professor can view information about a specific student or a checkpoint in a map-style report (see Figures 13 and 14). Data can also be downloaded in Excel spreadsheet format (see Figure 15). In this system, the professor can also check the percentage of students who have visited these checkpoints and answered the questions successfully. Such valuable information can be used to improve the future design of such experiential trips.

Figure 12 Online report on the Presentria GO web interface

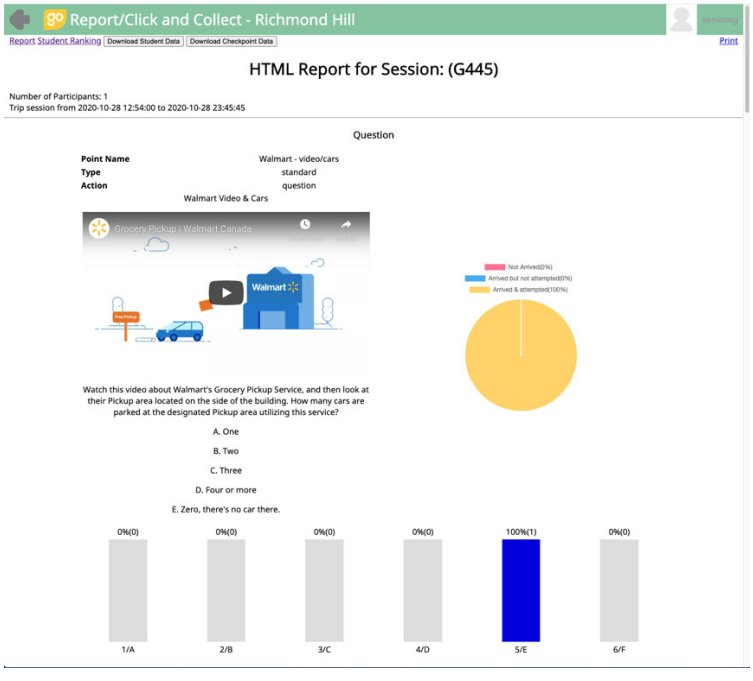


Figure 13 Online report showing trip information for a specific student in a map style

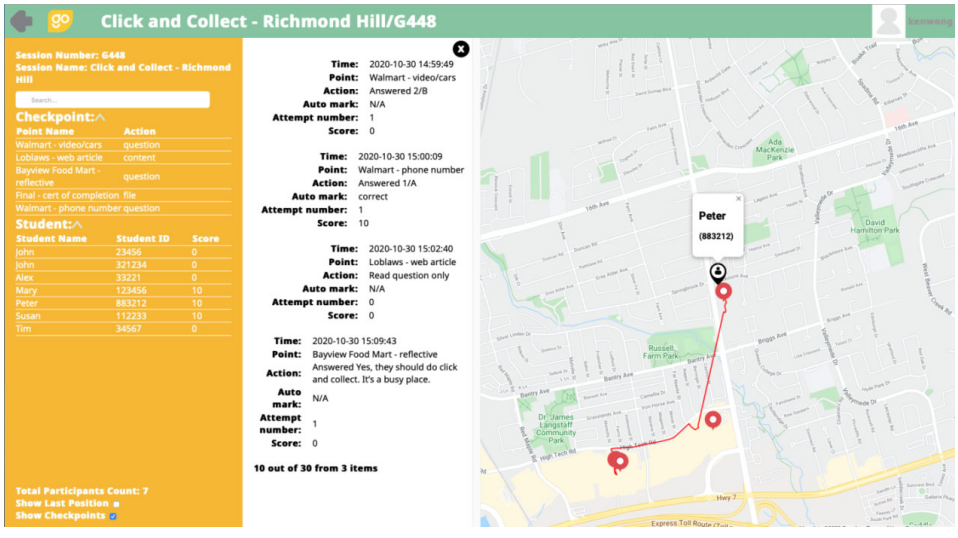


Figure 14 Online report showing trip information for a specific checkpoint in a map style

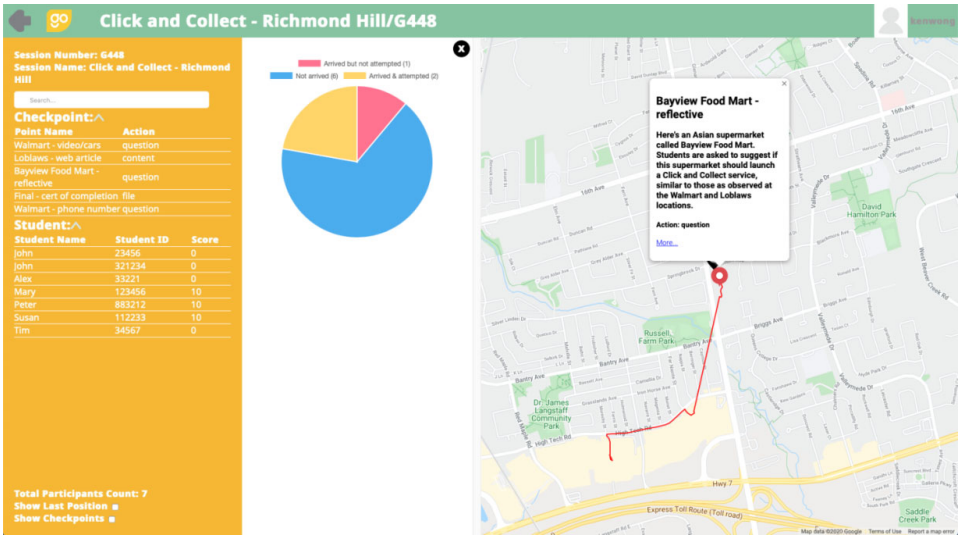
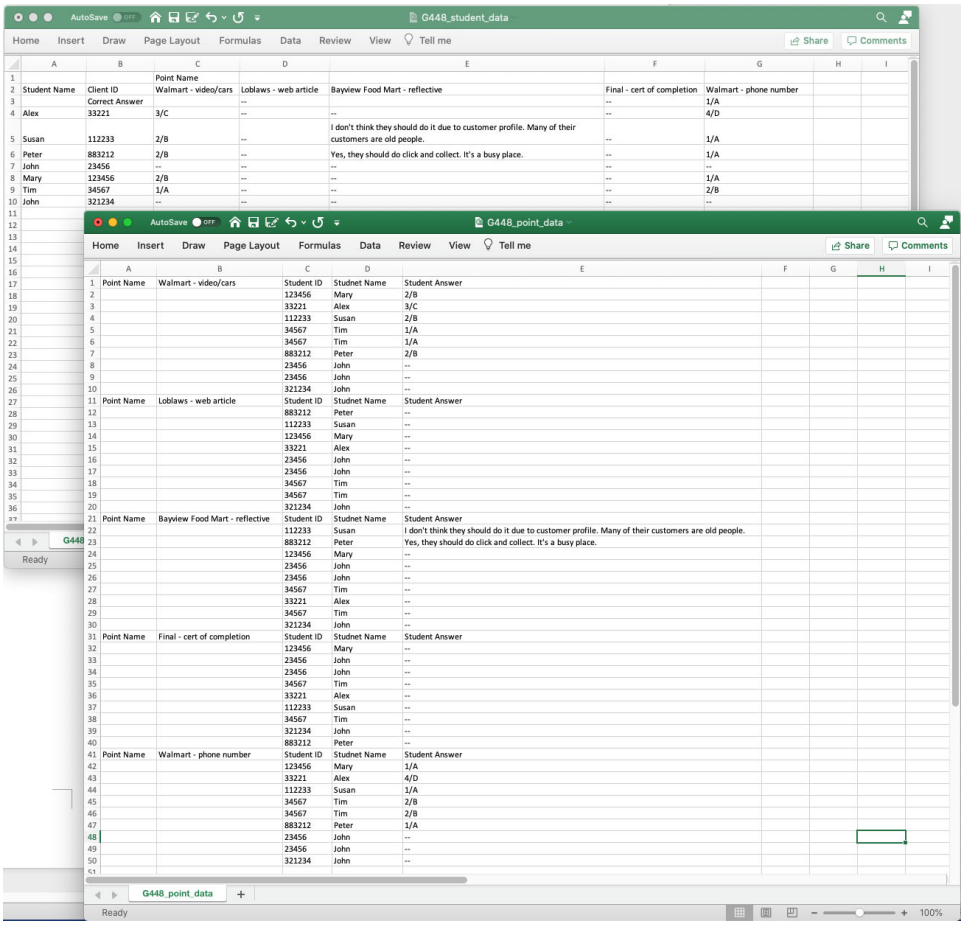


Figure 15 Student and checkpoint information is shown in excel spreadsheet format



	A	B	C	D	E	F	G
1			Point Name				
2	Student Name	Client ID	Walmart - video/cars	Loblaws - web article	Bayview Food Mart - reflective	Final - cert of completion	Walmart - phone number
3		Correct Answer		--	--	--	1/A
4	Alex	33221	3/C	--	--	--	4/D
5	Susan	112233	2/B	--	I don't think they should do it due to customer profile. Many of their customers are old people.	--	1/A
6	Peter	883212	2/B	--	Yes, they should do click and collect. It's a busy place.	--	1/A
7	John	23456	--	--	--	--	--
8	Mary	123456	2/B	--	--	--	1/A
9	Tim	34567	1/A	--	--	--	2/B
10	John	321234	--	--	--	--	--

	A	B	C	D	E
1	Point Name	Walmart - video/cars	Student ID	Student Name	Student Answer
2			123456	Mary	2/B
3			33221	Alex	3/C
4			112233	Susan	2/B
5			34567	Tim	1/A
6			34567	Tim	1/A
7			883212	Peter	2/B
8			23456	John	--
9			23456	John	--
10			321234	John	--
11	Point Name	Loblaws - web article	Student ID	Student Name	Student Answer
12			883212	Peter	--
13			112233	Susan	--
14			123456	Mary	--
15			33221	Alex	--
16			23456	John	--
17			23456	John	--
18			34567	Tim	--
19			34567	Tim	--
20			321234	John	--
21	Point Name	Bayview Food Mart - reflective	Student ID	Student Name	Student Answer
22			112233	Susan	I don't think they should do it due to customer profile. Many of their customers are old people.
23			883212	Peter	Yes, they should do click and collect. It's a busy place.
24			123456	Mary	--
25			23456	John	--
26			23456	John	--
27			34567	Tim	--
28			33221	Alex	--
29			34567	Tim	--
30			321234	John	--
31	Point Name	Final - cert of completion	Student ID	Student Name	Student Answer
32			123456	Mary	--
33			23456	John	--
34			23456	John	--
35			34567	Tim	--
36			33221	Alex	--
37			112233	Susan	--
38			34567	Tim	--
39			321234	John	--
40			883212	Peter	--
41	Point Name	Walmart - phone number	Student ID	Student Name	Student Answer
42			123456	Mary	1/A
43			33221	Alex	4/D
44			112233	Susan	1/A
45			34567	Tim	2/B
46			34567	Tim	2/B
47			883212	Peter	1/A
48			23456	John	--
49			23456	John	--
50			321234	John	--

7 Potential applications for in-car location-based experiential learning

7.1 Courses in K-12 and higher education

Educators can apply the concept of In-Car Location-based Experiential Learning in various formal and informal educational environments. Schools from K-12 to higher education can use it to take learning outside of the classroom. For example, in Primary schools, parents who live in Toronto can drive their children from along the waterfront, stopping to view Scarborough Bluffs, Humber Bay Park, and the Port Credit Lighthouse. Learners earn points by answering questions correctly about geography, history, and botanical features. In Secondary schools, parents can drive their young teenagers to heritage sites such as Fort York and Todmorden Mills to safely answer questions about historical events from their cars.

Another example can come from a college or university-level course in advertising. Students are asked to drive around the neighbourhood to observe outdoor advertising (e.g., Billboard and bus shelter ads) in selected locations and see applied theories in real-world settings. For Geography courses such as urban planning, students in Toronto can take a road trip around the Agricultural preserve in Pickering with farms leased to the government in anticipation of an airport 40 years ago. They would watch YouTube videos and articles related to this location and then complete course assignments on-site. Courses that can benefit from this learning mode include architecture, retail management, marketing, and many others. The possibility is endless.

7.2 Drive-thru scenic safari

The concept of In-Car Location-based Experiential Learning can be extended to other venues such as zoos, scenic safari and theme parks. For example, the African Lion Safari in Ontario can use such a system to increase customer satisfaction. It can deliver interesting YouTube videos and information about wild animals when its visitors drive their cars slowly across different safari zones. To make it more engaging, the safari can ask the visitors questions during the drive-thru and give them souvenirs if they could answer enough questions correctly (see Figures 16 and 17).

Figure 16 YouTube video about animals

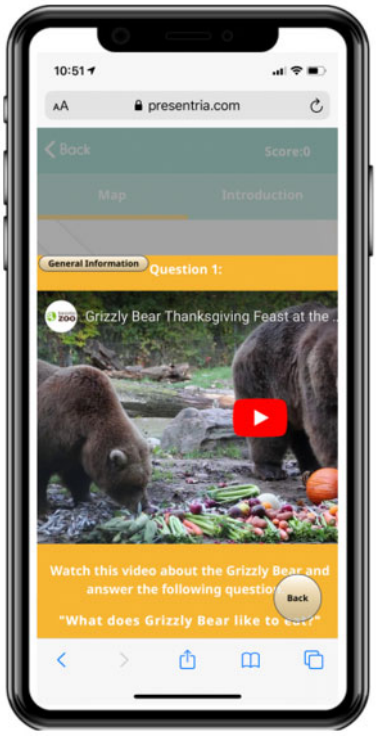


Figure 17 Asking questions

7.3 Flipping the classroom

Without a doubt, not everybody owns a car or has access to one during their study. Although ride-sharing services such as Uber or Lyft may open up possibilities for students to visit these outdoor locations, there are costs and other accessibility issues that the school has to address. Furthermore, some students are residing outside of the city or studying remotely from other countries, making it impossible to participate in the field trip that the professor designs. In this case, the concept of "flipping the classroom" can be applied. Professors can ask their students to pretend to be the teacher and design a trip around their city, no matter whether they are residing in another city or even in another country. Students are asked to research the topic, evaluate YouTube videos, find related web articles and think about the questions they can ask. By allowing students to develop such a trip that they can experience themselves via a car, a bus, or other transportation modes in their location, they can learn a lot about the topic on hand in a fun and engaging manner.

8 The rationale for in-car location-based experiential learning in Canada

For many students, especially the younger ones, engaging with school is a significant part of their well-being, which has been compromised by the extended period of remote learning and low social interaction levels during the pandemic. A survey conducted over the summer of 2020 revealed that nearly half of the Canadian children and youth went outside less than once a day during the pandemic. The reality is that many students are getting too much screen time and not enough exercise, affecting their well-being and happiness (Maximum City, 2020).

With schools closing their doors, approximately 5 million children and youth across Canada were no longer spending their days near their friends. Furthermore, 80% of the surveyed youth reported being bored at home and that only 27% of them agree that they

are doing an excellent job at getting schoolwork done from home (Ng and Badets, 2020). These alarming figures have called for innovation and adaptation to the Canadian education system.

Car journeys have become an essential part of everyday routines in North America (Hoffman, 2013). This is especially true for Canadians as Canada is a car-dependent and suburban nation, with more than two-thirds of its total population live in the suburbs (Gordon, 2018). The idea of learning experientially in a car may be a potential solution to address some of the mentioned issues during the pandemic. Students' well-being may be improved by getting them into their cars and driving around the city in such experiential learning trips. If appropriately implemented, this learning mode can be a sustainable 3rd option for learning in addition to classroom and online webinars at home during the pandemic and beyond.

9 An exploratory research on in-car location-based experiential learning

The success of any emerging pedagogical approach requires input from educators and school administrators at all levels. To better understand the feasibility and potential applications of In-Car Location-based Experiential Learning, an exploratory study was undertaken in November 2020. Method triangulation was utilised to check the consistency of findings. To gauge people's views on this innovative mode of learning, the researchers administered a 7-question survey to 74 participants who worked in the education sector. 47% of the respondents were university professors, 26% were college professors, 3% were K-12 teachers, and the rest were school administrators. Information was also gathered using expert interviews. 11 renowned professors[2] in Ontario were invited for an interview to explore this concept. In addition, a focus group was carried out with five college professors to learn about their attitudes, feelings, beliefs, and reactions towards this mode of learning.

9.1 The need for alternative learning method

During COVID-19, many schools have converted their classroom lectures into synchronous online webinars. However, the number of online webinars that students need to take can be high. This can pose issues to some students who may not feel comfortable with the online learning environment. In the survey, 64.8% of respondents agreed with the notion of ZOOM fatigue.

"The problem of ZOOM fatigue is real, and I think that it is a challenge for students," said one professor in the expert interview. "We definitely saw our students demonstrating signs of fatigue and had to remind our students to take frequent breaks and plan for outdoor time and self-care," said another in the focus group.

The call for an alternative learning method is prominent during this research. 86.5% of the survey respondents agreed that educators are looking for new ways to teach students safely in addition to classroom and online lectures at home. "I love the idea of sending students out of the virtual classroom to do experiential, place-based learning," said one expert during the interview. "I think any novel ideas to engage students are important to try," claimed another expert.

9.2 The idea of learning in a car

The proposed "In-Car Location-based Experiential Learning" method caught the attention of the research participants because the notion of safe learning is important during the pandemic. "With COVID-19 restrictions, it's much harder to do experiential learning, which is why your idea of car-based learning is so intriguing," proclaimed one expert during the interview. Similar views were observed in the focus group; some believed that a car could serve as one's safety bubble for learning. In the survey, only 35.6% of the respondents agreed that learning in a car is considered safe during COVID-19 and 30.1% held opposite views. These results are not unexpected because this innovative learning idea is still in its infancy stage in which educators do not have much experience with it.

10 The challenges of implementing in-car, location-based experiential learning

10.1 Lack of access to cars

Although the idea of learning in a car may sound interesting, the implementation of such a practice can be challenging. For example, 87.7% of the survey respondents expressed concerns about students' lack of car access when implementing such outdoor class activities. "It is not an inclusive design," argued one survey respondent. "You could start discriminating against students who do not own a vehicle," said another. These views were shared by the experts as well. As one expert pointed out clearly, "Many students don't have cars. A scavenger hunt doesn't have to be car-based!"

10.2 Unwillingness to drive around town

Even when one has access to a vehicle, some students may not feel comfortable driving to neighbourhoods that they are not familiar with. Furthermore, any adverse weather conditions (e.g., rain and snow) may pose danger in driving and discourage students from participating in this kind of in-car learning. The survey results reflected these concerns with 68.6% of the respondents highlighted students' unwillingness to drive around the city. "Given the economy, it is unlikely that students can afford the gas to drive around," said one survey respondent. This concern was generally felt among the experts and the focus group participants as well. Other related matters included the school's liability in case an accident happens during the trip, especially when students may not have proper insurance coverage.

10.3 Students not residing in the same city

Other than the car access issue, the fact that not all students reside in the same city could pose a challenge for the educators. "I have over one hundred students in my classes living outside of Canada, and even those in Canada are all over the country. I'm not sure which "places" I could include in such an exercise," wondered one expert. Others also shared this view in the focus group, "Many of my students were studying right now from China, India and Vietnam. I don't know how to get them to participate in this kind of in-

car learning," said one professor. A few solutions were proposed during the discussion with various educators to address this important concern.

One possible solution is to apply the "Flipped classroom" concept as mentioned earlier in the paper. That is, professors can ask their students to design a trip based on their physical locations no matter they are residing in Canada or other countries. By asking students to conduct research on the topics and visit their chosen location for observation, professors can utilise this opportunity to make learning fun and engaging. In the survey, 63% of the respondents believe that they can deploy the Flipped Classroom concept. "Yes, I believed that flipped classroom is an effective concept of self-learning," said one survey respondent. Meanwhile, some were sceptical about the implementation and logistics. One focus group participant said, "It might work for some courses but not others…after all, these are very new ideas, and I am not too familiar with the logistics to make it successful."

10.4 Lack of access to internet-enabled devices

To participate in this kind of outdoor learning activity, students are required to use their data-enabled mobile devices in the field. In the survey, 58.3% of the respondents had concerns about students' access to such mobile devices. Experts and focus group participants, in general, agreed that smartphone accessibility would be improved in the near future. With the recent launch of 5G wireless services across Canada by major cellular providers, many existing 4G/LTE devices are in clearance. The price of data rate plans has dropped due to intense market competition.

10.5 Small screen size and other issues

Another challenge faced by students when learning in a car is related to the smartphone screen size. 73.6% of the survey respondents agreed that the mobile device's screen size is too small for learning. However, experts and focus group participants believe that such issues will be gradually minimised as smartphones with big screen size begin to get popular in the market. In this exploratory research, an interesting point has been raised, and that is related to the steep learning curve and heavy workload that the professors may experience. It was suggested that proper training and course design are essential for the successful implementation of such an innovative in-car learning method.

11 Educators' interest in using in-car location-based experiential learning

Without a doubt, the concept of learning in a car can be controversial as it has various limitations and feasibility issues. Some students may not be able to take advantage of this learning method, especially in countries where people do not have easy access to cars. From the educators' perspective, it can be challenging to develop such outdoor activities for their students. Unlike in-class and online teaching that have been in place for years, very few educators have hands-on experience with in-car teaching and learning. That said, the proposed concept has caught the attention of many educators. In this research, 47% of the survey participants, 45% of the interviewed experts, and 40% of the focus group participants expressed interest in trying out this new learning mode in their classes.

When asked about the kind of courses and levels that can benefit from this kind of in-car learning, 65% of the survey respondents indicated that it would be suitable for courses in senior levels undergraduate program, master-level program, and post-graduate program. For example, in an architecture course, professors can send their students out in the field to check out the landscape and building design. Similarly, professors in a marketing course can get their students to visit different parts of the city to learn how out-of-home advertisements (e.g., billboards) are designed and set up. Other subjects that can benefit from in-car learning include archaeology, geography, history, marketing and real-estate management. Although primary and secondary school students can also take advantage of this mode of learning, such outdoor activity often requires their parents' participation and may become a show stopper. In this research, the respondents generally agreed that in-car experiential learning is more suitable for higher-education courses than others.

12 Future research direction

12.1 Using car window as screen

In a typical classroom, students look at the physical blackboard or projector screen during the lecture. If it is an online class, students attend webinars through computers that are often connected to external monitors for easy viewing. Although smartphone screen size has been increased gradually over the years, it is still relatively small compared to the screen encountered by students at school or home. As a result, some students, especially those visually impaired ones, may find it uncomfortable and difficult to use their smartphones when performing various learning activities in their cars.

Car technology has been advancing rapidly in the last decade. The idea of turning car windows into a lucrative 5th screen alongside TVs, computers, smartphones, and tablets is no longer a dream. Manufacturers have successfully built car window prototypes that can serve as computer screens to display all kinds of contents such as games, videos, and web. In 2011, Toyota developed a prototype called "Windows to the World" that enabled backseat passengers to draw on a touch-enabled car window to better view the scenery (Newcomb, 2018). Meanwhile, smart glass windows technology is being tested and integrated into vehicles across the automotive sector, paving the way to use car windows as computer screens for various computing applications (Gauzy, 2019). Future research can be carried out to see how such advanced car window technology can assist the development of In-Car Location-based Experiential Learning and make learning in a car a lot more comfortable and practical for students from all walks of life.

12.2 5G and beyond

The 5th-generation mobile network (5G) has created a paradigm shift in the market, as bandwidth-hungry and latency-sensitive applications can now be deployed over a wireless network to communicate with users at lightning speed. With the growing availability of 5G handsets and network coverage in the future, classrooms are getting smarter. Students can explore additional ways to learn that are simply not available to them previously (Moore, 2020). In addition, advanced technologies such as Virtual Reality (VR), Augmented Reality (AR), and Artificial Intelligence (AI) may get inroads

into various remote learning applications such as Presentria GO. This will make In-Car Location-based Experience Learning a lot more fun and engaging, as new content and activities may be delivered in the field. Our education system needs a transformation, and the availability of 5G wireless technology has opened the door to innovation.

13 Conclusions

Learning does not take place only in the classroom. The ongoing coronavirus pandemic has changed the education landscape and called for new, innovative ways to continue students' learning journeys outside of the classroom. This paper proposes the concept of In-Car Location-based Experiential Learning to better engage students in the field. Through exploratory research conducted among educators in November 2020, the benefits of this innovative learning method were explored, the implementation issues were identified, and the potential solutions were proposed. The Presentria GO system has demonstrated the feasibility and benefits of this active learning mode and served as a pillar in our desire to improve students' learning experience during the pandemic and beyond.

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Notes

1 Presentria GO is an international version of uReply GO, which was originally developed by Professor Paul Lam and his team at the Centre for Learning Enhancement And Research, The Chinese University of Hong Kong.

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