Adaptive Learning Environments
Student Seminar Series 2

Report

Group F

1. **Systems**: The game employs an engaging story and interesting characters to draw in the user, similarly to Crystal Island. In addition, it uses mental maps, as in Betty's Brain, to help retain the information introduced and progress through the stages.

2. **Participants**: The target users of this game includes prospective drivers who are not yet allowed to drive on their own due to their age, drivers who need to retake the driving test and drivers who did not drive in a long time.

3. **Learning Outcomes**: The system aims to adequately train its users in several aspects of the US Traffic Code. As the particulars of such a code vary from state to state, the system adopts a set of basic tenets that are nationally valid, to allow for the broadest deployment and use of the system. Ideal learning outcomes include skills associated surrounding the following:
   - Right of way at intersections
   - Vehicle, bicycle and pedestrian prioritisation
   - The ability to interpret traffic signs
   - Vehicle signalling and use of lights
   - Appropriate response to traffic incidents, such as collisions or diversions
   - Appropriate yielding to vehicles, overtaking and direction of travel rules

4. **Design**: The game is a point and click exploration adventure that aims to teach the traffic code to a variety of users.
   In the not so distant future, the city of Gurbnide is not the best place to live. Employment is low, and crime runs rampant. Many dream to move north, to Hyperborea, where the sun is always shining. However, due to the economic collapse in the year 20XX, cars are the only reliable way of transportation.
   The protagonist, Luka, has managed to obtain a driving license by sheer luck but the road to Hyperborea is still out of sight. Firstly, the exact location is unknown, although we know it is North of Gurbnide. Secondly, certain areas of the world are blocked off until the user accumulates enough "driving points" to gain access.
   Luka can move through the roads by simply clicking the direction he wishes to go, at times he might have to wait for other cars to move first or stop at signs. Points will be acquired if he manages to move without breaking any traffic regulations. A government issued satnav device will show the explored map and the points required to move to not yet accessible areas. In addition, it will store a list of all the rules Luka

has needed so far which will be available for him to review. The first few areas will require only 1 or 2 rules to pass through, but they will progressively get more complex as other cars join the intersection and new traffic sign are introduced. At certain checkpoints, the users will be prompted to create a mind map to help them visualize the rules and how they might affect one another.
As the story progress, characters will be introduced that will communicate with Luka via messages that might distract him while driving or in person at gas stations. Some might provide information about shortcuts, other might be rivals that encourage Luka to progress or share their own mind maps.

5. **Assessment**: The game will use a point system as a positive reinforcement to engage the players and encourage them to do the correct action. Although a driver would be penalized (i.e. issued a ticket) for not following the rules in the real world, a more positive approach was chosen to promote appropriate behaviour (Maag, J. W., 2001)

   The game will assess the student learning by calculating the elapsed time since the student started the task until he/she completed it. In order to complete the task successfully, the elapsed time should be within a predetermined range for each task. Taking more time indicates that the student was engaged in off-task behaviour while taking less time indicates that the student did not adhere to the rules (e.g. was driving faster than the speed limit).

The learning environments takes prior performance of the participants into account when assigning future tasks. If the participant demonstrated the lack of understanding of a certain rule, the system will issue tasks which ask the participants to demonstrate that particular rule. For example, if the participant failed to give way to a cyclist, even though though the cyclist was on the right, the system will introduce similar scenarios in the future. Furthermore, the rule will be colour-coded in the mental map, so that it can be distinguished when the users decides to review the knowledge.

Participants receive the task using the infotainment system which is a integrative part of the vehicle cockpit and is visible the whole time. Individual instructions are given in the form of sat-nav directions, in the same way the satellite navigation guides the drivers in real world, as demonstrated in Picture 1. [Carwow.com]

Picture 1 - Example of vehicle infotainment system. Similar layout will be used to deliver instructions to the participant.

Conclusion

By combining the gaming elements of the ALEs such as Crystal Island, as well as mental map of Betty's Brain, we believe that the system can effectively simulate the real world scenarios in a safe environment. The mental map aspect of the ALE, together with the feature which adapts the task to the performance of each participant are also likely to have a positive effect to learning outcomes.

References

[1] Maag, J. W. (2001). Rewarded by punishment: Reflections on the disuse of positive reinforcement in schools. *Exceptional children*, *67*(2), 173-186.

[2] Volkswagen Virtual Cockpit. Carwow website. https://photos-3.carwow.co.uk/blog/1600/passat.jpg