**Conclusion/FW Draft**

**6.1 – Research Question and Aim**

In conclusion, the research question of the project was asked to discover if procedural level generation could assist in improving player engagement levels, and replayability aspects, across 2D platformer games. This question was decided upon as it would result in players of the genre having improved satisfaction whilst playing their games, and would also improve the amount of content which is available for players, without putting unreasonable workload onto members of the development team.

As a whole, the project was successful in showing that a procedural level generation model could be used to improve player engagement and game replayability, as shown through the user feedback given during playtesting.

Overall, the project also managed to achieve its’ primary aim. During the research phase, the benefits of PCG algorithms were thoroughly investigated and considered, then, during the testing phase, the results of implementing these algorithms in the context of a 2D platformer were analysed and showed largely positive results in relation to player engagement.

**6.2 – Future Work**

Whilst the project was an overall success, there is still plenty of room for future additions and improvements. These potential future work areas were found during all stages of development and include some features which had to be omitted from the original application design due to time constraints, as well as ideas which were identified during the feedback review and analysis stages.

**6.2.1 – Omitted Application Features**

This section will cover features specific to the application which were originally included in the project design, but never made it to the final application. The section will discuss what the feature was, why it was cancelled and why it would add to the application overall.

The first feature which was omitted was the idea of allowing players to scroll through the level and zoom in or out to see more or less of the level. This was intended to be the final feature added, however this came across as a feature which would be more suited for a final game, as opposed to a tool designed for game developers, and the application was intended to lean towards the latter. This feature would however be a useful addition if the model were to be applied in a full-scale game, as it would allow players to get a rough idea of what to expect in the level before starting to play.

The next feature which was omitted was adding a fourth pass into the model which would use an AI version of the player to test if the level was possible. A significant attempt was made during the implementation stage to add this feature, however it was quickly discovered that the complexity of adding this pass would far surpass the timeframe dedicated to the project overall. This feature would be a major improvement to the application in the future however, as it would add a method to ensure players would never encounter an impossible level, which was a requirement of the project’s success. With the current state of the application, some freedom had to be removed from the generator to ensure all levels generated would be possible, but by using a testing model, this would allow constraints and rules to be loosened slightly on other passes, allow the model to potentially create even more interesting and varied levels for the player.

**6.2.2 – Feedback Improvements**

The biggest oversight during the feedback stage was the lack of a question which asked players why they did not complete some levels. If this project were to be redone in the future, this would be an extremely useful addition to the questionnaire, as knowing the reasoning behind players generating more levels than they have completed would help to evaluate if the model was generating impossible levels, which would be an area that would need to be iterated on and fixed appropriately.

Another key stage of testing which would have been beneficial for the project would be a section of quantitative feedback. This could include asking the testers questions such as how long loading times were prior to levels being generated, and whether certain features worked as intended, such as the parameter menu. This was not added to the original project as the author felt the project had been self-tested extensively enough to be confident that loading times would not be an issue, and all features were found to work as intended. This may not be the case if the project were to be scaled up with the additional features listed about however, and in this case quantitative results may be crucial for user-testing.

**6.3 – Final Summary**

Overall, the project was a success. With an increased timeframe and team size the scope could be increased, which would allow for an even stronger output, however in relation to the resources and scope of the current project, the output worked as intended and originally designed.

In the future, it is hoped that the research and examples provided in this project can help developers and studios to apply these ideas into their own games. This may help them to improve the 2D platformer genre, by creating vast amounts of new and interesting content for their players which may not be possible without the use of procedural level generation.