**Matrix of 3M Game Making Model - Pedagogical Features explored through Tensions and Resolutions\***

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| **Name of 3M Element** Short Description of the Element | |
| **Tension Emerging in Game Making** | **How 3M addresses this tension** |
| **Missions (design patterns as main missions)** Main Missions are game design patterns that makers add to their games. They should be familiar to players from pervasive game tropes. | |
| Learner disengagement if game coding is taught in an instructionist / from first principles (especially in younger ages) | Learners start with a minimal game to improve. Using a template to increase speed of feedback from learner input. |
| Learner frustration if they are not able to choose what feature they add to the game next | Present a wide range of different kinds of design patterns that learners can add to their game in the order they choose (with some exceptions). This facilitates engagement and motivation. |
| Teacher stress if they are not able to support a very diverse set of features demanded by students working on diverse kinds of games. | Limit the type of game to one kind. Offer a significant but limited menu of missions that users can add. Offer written and visual support documents which learners can access independently of facilitators |
| Learners take on features which are too advanced or complex for their current coding level | Limit the maximum complexity of missions and present patterns to encourage learners to start with ones that involve simple code changes but return a large change in terms of gameplay experience. |
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| **Missions (side missions)** Side Missions are optional, additional missions given when learners have established working patterns. These missions may highlight and encourage learners to explore key concepts or they may explain and celebrate different game making styles. | |
| Facilitators may have a more linear and limited view of ‘progress’ than learners | Side missions which explore and celebrate different ‘maker types’ (informed by Bartle’s player types) can provide the opportunity to discuss characteristics of different making/design approaches. |
| Systems concepts are embedded in many games but the process of direct teaching of such systems can be complex and interrupt and distract from other design activities. | Extra missions which highlight game challenge and user experience may help learners to explore systems concepts within the game context |
| Parents may feel a lack of confidence in taking part in coding activities which they have little cultural connection to. | Side missions which explore and celebrate both Bartle player types and |
| **Maps (of learning dimensions and learner journeys)** A map of project learning dimensions (following the work of Beval et al.) contains a matrix of probable concepts and skills that learners may develop through taking part in the game making activities. | |
| Facilitators may need to justify learning happening and struggle to see this in-situ if unfamiliar with the game making process. This may restrict openness of activities to better assess and support learning. | A map of learning dimensions flexibly linked to main missions/patterns can be used by both learners and facilitators. |
| If it is not recorded, learners and facilitators may lose track of what has been covered in the process of making a game. Thus reducing opportunities for project reflection. However, stopping activity to record formally interrupts the enjoyment of game making. | Tracing the learner pathway on an attractive physical map in the learning space can help integrate navigation and reflection into the creative process. |
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| **Methods (to increase motivation and inclusive practice)** A set of other pedagogical methods that help the game making process align with inclusive practice project based learning principles. | |
| Learners may not find coding a project a motivating project if it is only a private activity with no end audience. | Play Testing - each lesson can help with short term motivation of having a game product ready for others to play. Showcase events help longer-term motivation towards and aid prioritisation as learners near the end of their project. |
| Learners may feel alienated from coding as a practice and need a way into the process. | Drama and fictional scenarios can help explore issues and reduce learner anxiety though coding in a role. |
| Learners interact with code primarily using the mouse keyboard and screen which does not take advantage of benefits of physical computing for learner engagement. | Connecting arcade buttons to the computer via simple electronics is a project which can be completed quickly. The process of students building their own arcade cabinets for a games showcase increased their perception of the authenticity of their end goal |

**Notes \***

This document uses terms learner and facilitator. In the context of family learning a Facilitator can be either a professional educator or a supporting parent. This simplification of the complexity of roles in family learning and classroom settings is done here to make the table more accessible for readers.