CRAIG DEED

3. USING A GAME-DESIGN PROJECT TO AFFORD TEACHER AND STUDENT AGENCY

AGENCY

How is agency imagined and enacted by teachers and students as the restraints of the enclosed classroom are peeled away? This question is considered here by drawing on socio-cultural theories to examine the mutuality of teacher and student agency in a personalised learning environment. This discussion takes into account the literature and is demonstrated by a case study of the complex interplay of expectations and perceptions of self and others during teaching and learning.

Agency is a complex interplay between the teacher and student and the active affordances and constraints of the context. This chapter starts with Giddens' (1984) notion of agency, broadly characterised as the capacity to *act differently.* This introduces the notion of capacity and power, key cultural constructs useful in any consideration of building capacity of low socio-economic students. In this case, the construct of agency frames an examination of teacher and student interactions within a personalised learning context that affords an "imaginative distance from (habitual responses)" (Emirbayer & Mische, 1998, p. 1006).

Here, agency is considered in terms of personalised learning. In a personalised learning environment, the students' developmental needs, capabilities, perspectives, and approaches to learning are addressed (Prain et al., 2014). In this context, influences on teacher and student agency are multi-faceted and complexly inter-related. While teachers and students have routine ways of acting in a conventional classroom, a personalised learning context affords different, non-routine, versions of agency (Johnson & Liber, 2008). This is of particular relevance to an examination of agency as a lever of teacher and student engagement and learning. This is consistent with the argument that, in new or alternative contexts, agents "must explain and underpin their actions and choices by 'rational' arguments rather than by referring to 'traditional' ways of doing things" (Brannen & Nilsen, 2005, p. 416).

It is useful to apply Edwards' (2007, p. 7) discussion of "relational agency" to any rationalisation of the exercise of teacher and student agency. In particular, the tendency for both to demarcate, and then continuously and reflexively redefine, relative spheres of influence (Edwards, 2011). Relational agency acknowledges the role of individual capacity and purpose, but makes the point that interaction (student-student, student-teacher, teacher-teacher) contributes to a dynamic common knowledge. Reflexive mutuality is evident as teachers and students engage with the others' intentions and

V. Prain et al. (Eds.), Personalising Learning in Open-Plan Schools, 43–55.

actions in the classroom. In the case examined in this chapter, this mutuality occurs between the teacher's design and implementation of a personalised curriculum, and an expectation that students take responsibility for their learning. This chapter addresses the question therefore, of the nature and scope of both teacher and student agency, sphere of influence, and its exercise; and how this contributes to the creation, sustainability, and refinement of the culture of personalised learning.

Student agency is grounded in their experience, enactment, and knowledge of the conventions of the classroom context. Conventions are usefully seen as a loose set of understandings allowing considerable scope for students to react in a range of ways (King, 2000). Teaching approaches, such as those based on theories of cognitive constructivism, may assume inherent student agency. Constructs like student autonomy, self-regulated learning, and mastery approaches to learning, require agency in terms of different (and usually more complex) learning behaviours: for example, non-linear approaches to problem- solving (Scardamalia & Bereiter, 1991; Zimmerman, 2002).

Teacher agency emerges from a dynamic blend of theoretical, formal, practical, and informal knowledge and reasoning about teaching and learning (Clandinin, 1985; Hoekstra & Korthagen, 2011). Teacher practice knowledge is simultaneously drawn upon and rebuilt through day-to-day classroom activity and is evident in past experience, present thinking and action, and future planning (Connelly & Clandinin, 1988; Elbaz, 1981). Teacher agency may be characterised as somewhat practical in nature, based on perceptions about *what works* in their own classroom context (Hargreaves, 1997). However, there is also an element of projection in terms of *what might work*. Teacher agency then, is generated through perceptions, reactions, questioning, and adaptation to contextual activity (Cochran-Smith & Lytle, 1999). As noted by Ottesen (2007) and others, making sense of practice is continuous as teachers adapt to contextually ground experiences.

Agency for both teachers and students is an interaction between individual knowledge of conventional action, awareness of action possibilities for acting differently: and the opportunistic reasoning for realising this capacity. This can be characterised as an interdependent relationship between teacher, student and context (Campbell, Robinson, Neelands, Hewston, & Mazzoli, 2007). Consider, for example, the agency required when students engage in reflective problem-solving discussion (Paris & Paris, 2001). In terms of agency, students are likely to project themselves according to how they understand the context, as socially constructed through teacher and student interaction. In this example the teacher's capacity to afford reflection and the student's ability to be reflective will become apparent to each other and subsequently afford more refined versions of agency.

Teacher and student agency is nested within institutional, pedagogical, and socio-cultural constraints, evident in perspectives of teaching and learning routines and roles and responsibilities (Prain et al., 2014). This is coherent with Greeno's (2009, p. 273) argument that "the context of an activity is constructed by participant(s) as a framing in the kind of social and discourse practice the participant(s) understand(s) her- or himself or themselves to be engaged in, rather than treating the context as

something that is given in the situation." The teacher and students must imagine how they can and will adapt reflexively to the possibilities and constraints of classroom-based activity.

Agency can be characterised as a variable individual contestation of habitual teaching or learning practices in different learning spaces through a deliberate seeking of, and interaction with, other refined affordances, interpretations, and perspectives.

PERSONALISED LEARNING AND GAME DESIGN PEDAGOGY

There has been recent appreciation of how game design can inform approaches to effective pedagogy (see for example Gee, 2003). There is an emerging theoretical conceptualisation of the relationship between motivation, engagement, and complex problem-solving during game-based learning, including game design and play (Eseryel, Law, Ifenthaler, Ge, & Miller, 2014). Certainly the motivational aspects of digital game-based learning are well recorded (Hwang & Wu, 2012).

Game design and play requires knowledge of the skills and processes to simultaneously design, image, and critique a gaming experience (Salen, 2007). Digital game design includes problem-solving, strategic thinking, information processing, negotiation, collaborative investigation, and decision-making and self-regulation (Gros, 2007). There is particular emphasis on digital identity, online communities, and networks (Salen, 2007).

Game design characteristics are largely congruent with the principles and strategies of personalised learning (O'Neil, Wainess, & Baker, 2005). Specific features typical of game design include student negotiation of aspects of content, modes of investigative and problem-based learning, and peer review and assessment (D. Edwards, Deed, & Edwards, 2014). In this case, a key cultural affordance of agency is the way the teacher conceptualises how they will support student autonomy in relation to analytical discussion, research, and reflection (Gros, 2007). Building learner competence in new spaces is complex because the scaffolds tend to be collective and include the teacher as well as peers and web-based resources.

The pervasive use of social networking technology in game design and play accentuates the use of informal learning environments (Dabbagh & Kitsantas, 2012). This networked or collective intelligence affords use of multi-modal representation, accessing diverse opinions, and purposefully building knowledge through iteratively accessing, questioning, and applying ideas and experiences (Deed & Edwards, 2013).

The use of technology in game design allows students to shape their own learning, although this may be somewhat incoherent, or may be perceived as a disruption to the formal purposes of the teacher (Selwyn, 2009). Online gaming networks provide distributed environments that are easy to access and useful for building social and community identity, networking, and learning, and afford educational purposes including communication, collaboration, and resource sharing (Mazman & Usluel, 2010).

Learning afforded by technology is "unconstrained by time, place, or formal learning structures" (Oblinger, 2004, p. 4). Computers are frequently based in classrooms, or at designated learning stations or laboratories. Students also have access to mobile technology, including tablets and smart-phones. Although a dynamic concept, mobile learning environments typically include those created by an individual or group to achieve a learning purpose through the use of mobile technology (Collinson, 1999; Solvberg & Rismark, 2012). This afford new conceptions of learning as personalised, learner-centred, situated, collaborative, and ubiquitous (Collinson, 1999; Sharples, Taylor, & Vavoula, 2010).

In essence, a game design project sanctions teachers and students to exert new forms of agency, making choices about different teaching and learning structures and relationships (Collinson, 1999).

CASE STUDY: GAME DESIGN PROJECT

A game design case study demonstrates the complexity of the relational and nested interactions between agency and pedagogical approaches affording personalised learning. The purpose is to provide an example of how agency was projected and enacted by teachers and students. This case study focused on the teacher and 25 Years 9–10 male students in a Programming elective class unit, over a ten-week term at Grevillea College. Students elected to complete this unit based on either prior experience or an interest in programming; the aim was for students to design and create a digital game. As part of the process students had to enact core elements of game-design, including creating a storyline, rules and levels, and balancing gameplay with learning activities.

Data were collected through two interviews with the teacher, one in 2011 during an earlier iteration of this elective about planning and design for the following year, and one mid-term in 2012. Classroom observations were conducted for two hours a week over ten weeks in 2012. During the observation period, students were informally interviewed about their project, their interactions with peers and the teacher, their approach to problem-solving, and their evaluation of the project. In addition, students were asked to complete a brief survey identifying problems they had encountered and how they resolved these.

For the data analysis all observation and interview notes were transcribed. The broad categories of learning environment, personalised learning strategies, and teacher and student agency were used to inform the initial data review. Within each category a number of structural codes relating to choices and reasoning were identified (Saldana, 2009). The initial categories and codes were reviewed in a second and final analytical sweep of these data by the researchers. The key themes emerging were related to the linkages and relationships between teacher and student agency and personalised learning strategies.

Table 3.1 shows the Personalised Learning Experience Questionnaire (PLEQ) data (student perceptions of the extent to which their learning environment was personalised) for 2011–12, mean score for each of the nineteen scales, for males, Years 9–10, at Grevillea College (for a full discussion of the PLEQ please refer to Prain et al., 2014; Waldrip et al., 2014). These data indicate the general male student cohort perception of experienced learning practices at the school where the case study was located. Students who elected to enrol in the game design project were drawn from this cohort. Female students were not excluded from enrolling, but none did during the data collection period.

The scales with the lowest scores refer to practice that is experienced infrequently. It may be inferred that these practices are either: (a) the most difficult for a teacher to encourage; (b) the most difficult for a student to undertake; or (c) a combination of these two. This provides an indicative map of the context for teaching and learning affordances and constraints, and suggests a typical cohort experience. It is noted that each learning activity is both grounded in, and can act to modify these learning experiences.

Table 3.1. Grevillea college, years 9–10 males, 2011–12

Scales	*Mean*	*N*	*Standard Deviation*
Self-control	3.80	211	0.67
Self-management	3.70	216	0.62
Peer relations	3.53	211	0.92
Academic efficacy	3.44	212	0.89
Cognitive engagement	3.43	214	0.77
Desire for learning	3.37	209	0.80
Congruence with planned learning	3.32	217	0.80
Transparency	3.26	211	0.92
Behavioural engagement	3.23	216	0.87
Teacher support	3.20	213	0.95
Opportunities for personal development	3.17	209	0.96
Emotional engagement	3.10	211	0.99
Student negotiation	3.08	212	0.94
Authenticity	2.91	215	0.92
Personal relevance	2.90	216	0.94
Individualisation	2.84	201	0.85
Shared control	2.73	215	0.96
Student consultation	2.68	216	0.97
Self-reported disruptive behaviour	2.58	207	1.03

The five highest scoring scales were: self-control (mean = 3.80), self-management (3.70), peer relations (3.53), academic efficacy (3.44), and cognitive engagement (3.43). These scales indicate considerable student experience in some elements of agency, including: self-directed learning; positive and supportive peer relations; problem-solving and coping with challenging work; and making an effort to understand.

Excluding self-reported disruptive behaviour, the five lowest scoring scales were: authenticity (mean = 2.91); personal relevance (2.90); individualisation (2.84); shared control (2.73); and student consultation (2.68). These scales indicate students have limited experience in enacting certain elements of agency including: applying tasks to real life everyday situations outside of school; making choices about topics, use of materials or activities; and co-planning learning activities and assessment tasks with teachers. It may also be argued that teachers also typically struggle to afford a learning environment where these aspects of agency may flourish.

The game design project was designed to provide a personalised learning experience. While it did not explicitly address the low scoring scales above, it did focus on the use of a variety of resources, scaffolding for individual learning needs and approaches, teaching in a variety of ways, and enacting different teacher and student roles. This is coherent with Prain and colleagues (2014) who identified that personalised learning approaches are effective when there is a reasonable fit between individual learning perspectives, approaches to learning and capacity, and the demands of the learning activities. In relation to affording agency, the teacher, Jason, wanted students to take increased responsibility for their learning, and to develop collaborative learning and problem-solving skills. He reasoned that the game design project would: allow him to trial innovative pedagogy; improve his knowledge of how to effectively use flexible classroom spaces; and appeal to the learning preferences of contemporary students.

Jason assumed that his students would be able to take more control over their learning activities and approaches. Students had to develop an understanding of game design mechanics and then develop a storyline using a programming language. Project design was largely an independent process, supported by online materials and tutorials. There were also opportunities for whole-class explanations and demonstrations.

Students were provided with computer work stations to work on their product. Jason explicitly required students to practise skills of collaboration, communication, problem-solving, and research. This meant that students could use a wide array of resources, including: peers; online communities of game designers or specific programming language sites; other online resources, and the teacher. Jason expected that this expansive network of resources would augment the conventional top-down teacher-directed approach to learning.

Jason tended to explain and demonstrate material and resources using an interactive whiteboard at the front of the room. This occurred on a needs basis, such as when Jason noticed common questions in the online forum. Students functioned

as a class unit for a small percentage of their time. Students were generally free to move about the room to work with, assist, or seek assistance from peers.

Virtual learning spaces were used in a variety of ways. Jason used a learning management system where he posted links to online tutorials and support materials for the programming language, as well as other information about the task. An online forum was also available for students to post questions of class peers. Jason monitored the forum and occasionally contributed. Students were encouraged to conduct research online to locate other resources to support their game design task. This included using YouTube clips, which they had to view off-site because the school had banned in-school access. In addition, students were encouraged to join online game design special interest group forums. If students located any useful links or resources they could post these in the learning management system.

Students tended to work individually and had a high degree of control over the selection and employment of learning strategies. The planning and design of the game prior to programming were important stages and required students to use imagination, representation and communication, and negotiation skills as they developed their storyline.

Higher-order thinking and metacognition were visibly evident in the online forums, class discussions and demonstrations, and individual game design coding and revision. This included students planning, enacting, monitoring and adapting their own cognitive strategies in order to effectively complete the task (Zimmerman, 2008). Metacognitive processes are critical for the development of agency through students autonomously analysing problems, examining personal thinking, and explaining and justifying individual reasoning processes.

Problem-solving was a particular indicator of the shared control aspect of agency. As expected by the teacher, student use of programming language created a constant set of issues for students. During the data collection, students were asked to identify who they would ask for help to resolve a problem during the game design and creation. The students' responses indicated that their primary strategy was to try, through trial and error, to independently solve the problem. The second most common strategy was talking to other students in the class, followed by talking to the teacher. Using online resources for problem-solving was usually tried after independent, peer- or teacher-based strategies.

One example of problem-solving is provided by Mitchell, who had been working on his game at home and was ready to test it. As he played the game he realised there was a coding error that had resulted in the 'Home' button not working. Mitchell read over the programming code and tried various changes. Although frustrated, he continued to work by himself using trial and error. Eventually he went online and found a game design site. He posted his question and over the week had several responses. Generally, Mitchell was not happy with the usefulness of the responses, and he resumed his trial and error approach. This continued for the remainder of the project as he worked alone trying different means of resolving the programming

issue. This example was unusual in that there was little peer collaboration – a key feature regularly observed.

The students were generally reluctant to use the online tutorials and tended to learn about programming language using trial and error. Initially there was a high degree of off-task behaviour with students playing games or chatting. Jason circulated and strategically talked to students one-on-one to get them focused. As the term progressed Jason continually reminded the students about the project timeline and the task requirements.

DISCUSSION

Consideration of the dynamic and contextual nature of agency involves investigation of how the teacher and students jointly create, work in, and reflexively maintain a space that affords quality learning. This includes taking account of the reflexive interactions between individuals and the context and conditions within which they make choices and experience the consequences of those decisions and understandings (Brannen & Nilsen, 2005). As was evident in the survey reported in Table 3.1, students taking part in the game design project had limited experience in enacting elements of agency including: applying tasks to real life everyday situations outside of school; making choices about topics, use of materials or activities; and co-planning learning activities and assessment tasks with teachers. Some of these elements of agency featured in the learning practices experienced by both the teacher and students during the game design project. Students were involved in choices about topics as they created their own game, and were responsible for assessment as their peers determined if a completed game was comprehensible, workable and interesting to play.

While the task did not afford the co-planning of learning activities this is an indication of the complexity of personalised learning. It also provides direction for the ongoing development of quality teaching and learning tasks that further develop teacher and student agency.

In drawing on the literature and case study findings it is possible to identify how agency is projected and dynamically enacted through teacher and student interactions in an environment affording personalised learning. Essentially agency is a shared orientation and ongoing negotiation contributes to a culture supporting learning. This required an awareness of each other's intentions, motives, values, and purposes. Further, both teacher and students had to be responsive to the possibilities and constraints or uncertainties of the physical, virtual and social learning environment. Teacher and student agency can be conceptualised as a set of ongoing reflexive choices about personalised learning grounded in context. The perceived affordances of personalised learning interact to produce teacher and student expectations and perceptions about their own and each other's choices and actions.

Teacher agency, evident in the actions taken to project, create and maintain a learning environment conducive to personalised learning can be characterised as:

- being willing to enact different approaches to teaching and learning;
- using flexible learning spaces, both physical and virtual;
- providing students with a task structure that supports making choices about topics, use of materials and activities, based on personal interest and experience;
- providing scaffolding in the form of in- and out-of-class resources including a learning management system that was maintained by the teacher but included sharing of student identified resources and exemplar material;
- Supporting the development of student agency, including co-regulation of activities and application of problem-solving approaches. Regular individual and social reflection activities are used to monitor student progress, engagement with the task and to provide the teacher with information about the efficacy of teaching and learning strategies and approaches.

Student agency can be characterised as:

- personal knowledge of learning strengths and preferences as a basis for adaptation to the project requirements and context;
- effortful application of higher-order thinking and metacognitive skills;
- co-regulation (peer-peer and peer-teacher) of learning activities, including application of problem solving skills;
- active and autonomous learning through an orientation to task requirements and expectations, goal-setting and monitoring, awareness and selection of learning strategies, responsiveness to feedback, and reflection on their learning approach and achievement;
- proficiency in their use of Web 2.0 technology to support their learning. They are able to seek and apply information, use analytical and evaluative strategies to determine the most useful and practical sites and processes, and to demonstrate learning through the use of multi-modal representations and communication.

The case study presented here details momentary contextual transactions of agents in personalised learning spaces. The analysis considers the teacher and students' conceptualisations of teaching and learning, and perceptions of learning-related intentions and transactions in that environment.

Edwards' (2005) notion of relational agency provides an explanatory frame that emphasises the mutuality of agency. This is evident in the reflexive monitoring by both students and the teacher, and is symbolic of the rich reciprocity between student, teacher, task, and contextual interactions. These perceptions and resulting choices are immediate, continuous, reactive, and typically complexly grounded in the environments affording agency.

In the case study, the teacher created a learning culture that encouraged student autonomy. This was evident in the task design, and included modelling of co-regulation, and framing and authorising the use of distributed expertise within and external to the classroom (Hadwin, Miller, & Winne, 2011). The teacher made choices to realise a personalised curriculum. This included supporting a

culture of co-regulatory relationships, encouragement of student responsibility and problem-solving, use of flexible learning spaces, and networking and interactivity. By requiring students to develop their individual games, the game design project addressed differences in student preferences, abilities, interests, and readiness.

The task design afforded student agency. The teacher was a key influence in this sense of agentic possibility by effectively facilitating the use of various learning spaces and designing pedagogy sympathetic to personalised learning. The task design centred on the regular class meetings, where the teacher explicitly provided direction, explanation, and modelling.

The task design encouraged students to seek and apply multiple strategies for game design and creation, and to find solutions for problems. These strategies are consistent with those suggested by Stefanou, Perencevich, DiCintio, and Turner (2004) to support cognitive autonomy. The teacher had to come to terms with allowing students to exert agency and recognise that, at times, the students' expertise would exceed that of the teacher. Of course, some students were more competent than others. The dynamic mutuality of agency meant that the teacher could encourage independence in all students but support those who needed more assistance. In response, the students generally showed a capacity to make choices and take actions that were appropriate within the teaching and learning context, although it is important to note that these achievements were not universal.

This approach assumed that students would be autonomous problem-solvers. The progress of the task was associated with increasingly difficult and complex problems. Students used a variety of strategies, including: interaction with peers, online tutorials, class forums, and gamer networks. As problems became increasingly complex, students sought support and guidance from the teacher. This required careful balancing of teacher and student agency in order to maintain a frame of productive activity without removing autonomy. This was consistent with the view of teacher and student agency as a complex and dynamic interplay between individual capacity and the affordances and constraints of prior experience, generated by the related teaching and learning culture established for this task (Archer, 2003; Emirbayer & Mische, 1998).

IMPLICATIONS AND CONCLUSIONS

The reflexive mutuality of teacher and student agency demonstrates several aspects of the complex contextual interaction between teaching and learning. Student agency was evident when students engaged with the action possibilities of the pedagogical intent of the teacher. The level of investment students made in realising the affordances of the personalised learning context was particularly evident in their problem-solving approaches and strategies. Teacher agency was apparent in the deliberate co-regulation of learning, creating a culture that supported independent student problem-solving and the management of teaching and learning processes. The mutuality was observed in each agent's sense of the other's investment in learning. A question emerges here,

as a basis for future research, about the balance between allowing students to self-manage their own developing agency and the co-regulation of this development by educators. The balance is most important when increasingly challenging tasks result in the possibility of greater depth and breadth of learning.

This case study demonstrates that the teacher has considerable responsibility for designing a high-quality curriculum that affords a culture of agency. This is successful when the social processes of learning include intentional and purposeful activities that question and reform classroom routines (Deed, Lovejoy, Prain, & Waldrip, 2014). A number of implications are apparent for affording teacher and student agency in open-plan personalised learning environments.

- Teachers must intentionally work to develop a classroom culture supporting agency – for example giving students increased responsibility for planning, monitoring, and reflection.
- Teachers and students need to explicitly model and explicate their teaching and learning choices relating to the use of flexible classroom spaces and personalised learning strategies. This makes visible the higher order thinking and metacognitive processes being employed by both teacher and students.
- Student exemplars of task design and enactment, with emphasis on subsequent problem-solving approaches and strategies can be used as models of agency in practice.
- Models of complex problem-solving can be identified based on student examples of practice. These can provide a frame for discussions about establishing and maintaining agency.
- Models of distributed expertise can likewise be identified. These will explicitly draw on resources within and external to the classroom. This will raise questions about efficacy in dealing with formal and informal information and learning resources.
- Constraints on the exercise of teacher and student agency should be explicitly identified and noted in classroom discussion of the learning process—questions and perspectives about the impact of these constraints are likely to inform productive projections of agency.

Our discussion of agency provides a conceptual frame for an examination of building capacity to change the classroom and school culture. The case study and literature show that this is a mutual and reflexive process. However, there needs to be some degree of overt intention from both teacher and student to enact these processes in order for both to engage in what might be characterised as quality learning—commencing with engagement.

Conversations like these should be about the efficiency and effectiveness of emerging agency, with a focus on teacher and student reasoning for reflexive choices and strategic actions. The workability and durability of acting differently should be attended to, as the investment of teachers and students in innovative learning-activity design and enactment is often considerable.

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