Using a learning management system to personalise learning for primary school students

Bronwyn Edmunds, Freemans Bay School
Maggie Hartnett, Massey University

Abstract

This paper reports on one aspect of a descriptive multiple-case study which set out to explore the role of a learning management system (LMS) in personalising learning for students from the perspective of three teachers in one primary school in New Zealand. The intention was to provide insight into the role the LMS could play in classrooms when personalising learning. The research project involved gathering multiple sources of data from interviews and observations, and documentary information from the LMS. The findings suggest that the LMS has the potential to be a key part of a primary classroom environment when it is built on components that personalise learning. For the teachers in this project, one salient component of personalised learning involved ensuring learning was based on assessment for learning pedagogy and the use of the LMS as a tool to support learning. The findings highlighted the interconnected nature of personalised learning pedagogy, the LMS and classroom practice.

Keywords: personalising learning; personalised learning environments; personalisation; assessment for learning; learning management system; primary classrooms; elementary school; blended online learning; formative assessment

Introduction

Personalised learning, digital technologies, and learning management systems (LMSs) are currently hot topics in the schooling sector. Personalised learning has recently gained momentum because significant advances in digital technology over the past decade have opened up new opportunities through the creation of customised e-learning environments (Demski, 2012). An LMS can personalise learning by encouraging teaching approaches that hold the student at the centre of the learning process (Seiler, as cited in *Interface Magazine*, 2009). These processes are underpinned by assessment for learning (AFL) principles and encourage collaboration, while also taking advantage of evolving digital technologies (Ministry of Education, 2012). However, there is little research about how the LMS has been used in schools (Watson & Watson, 2007), especially primary schools.

Literature review

Researchers and policy makers (West-Burnham, 2010; Wolf, 2010) argue that personalising learning is a key strategy for improving student engagement and academic achievement. While some researchers (Abbey & Baylis, 2011) consider personalised learning to be evolving despite

evidence for its overall success, others (Keamy, Nicholas, Mahar, & Herrick, 2007; Wilmot, 2006) argue that there is substantial evidence of success in a variety of contexts. Meanwhile, some (Conole, 2010) claim that the key to effective personalisation of learning is to use digital technologies.

Personalising learning

The precise terminology—personalised learning, personalising learning, or personalisation— causes confusion because there are numerous terms used in the literature (Bray & McClaskey, 2013; Underwood et al., 2007) with only slight variations in their definitions. The most common element of a 'personalised learning' definition refers to an education system that focuses on learning which is tailored to the needs, attitudes, and interests of every learner. The learner is at the heart of the process and, accordingly, the corresponding education system supports the growth of the whole child, ensuring that every student achieves their highest possible standard (West-Burnham, 2010; Wolf, 2010). Milibrand (2004, p. 8), refers to personalised learning as "high expectations of every child, given practical form by high quality teaching based on a sound knowledge and understanding of each child's needs". This appears to be a widely accepted definition (Besley & Sokoloff, 2004; Wilmot, 2006). However, Hargreaves (2004) cautions educators to be open to a changing definition of personalised learning as it becomes increasingly woven into practice.

Personalised learning is not the same as free-for-all learning (where pupils are left to their own devices) or individualised learning (where students are separated to learn on their own (Treadwell, 2008). Bray and McClaskey (2013) explain how the differences between personalisation, differentiation, and individualisation lie in who is in control of the learning. The key difference is that the student drives the learning when it is personalised, whereas the teacher drives the learning when it is differentiated or individualised.

Components and features of personalised learning

Research that explores personalised learning highlights a number of components and related features. Five core components common to the essence of personalised learning have emerged from the literature (Abbey & Baylis, 2011; August et al., 2007; Besley & Sokoloff, 2004; Bevan-Brown, McGee, Ward, & MacIntyre, 2011; Hargreaves, 2004; Keamy, et al., 2007; Treadwell, 2008; West-Burnham, 2010; Wilmot, 2006; Wolf, 2010). These components comprise AFL, curriculum entitlement and choice, effective teaching and learning, strong partnerships, and schools as learning organisations. This article focuses specifically on the 'assessment for learning' component of personalising learning, as it relates to the LMS.

Assessment for learning, sometimes referred to as formative assessment, is the teaching and learning process that is based on interpreting evidence for use by learners and their teachers to decide where the learners are in their learning, where they need to go, and how best to get there (Assessment Reform Group, 2002). At its most fundamental level, AFL encompasses student-focused learning, use of rich evidence and dialogue, identification of learning needs by student and teacher, goals and next steps set by student and teacher, learning and progress that are jointly planned and monitored, effective grouping, differentiated instruction, insightful reflection (i.e., justify, answer, explain), and effective feedback to learners.

Personalised learning: A catalyst for reform

The concept of personalised learning has been slowly evolving and gathering momentum since it emerged in the late 1980s (Abbey & Baylis, 2011). Teachers and schools have attempted to design their teaching to meet the needs of students with varying degrees of success (Green, Facer, Rudd, Dillon, & Humphreys, 2005; Wolf, 2010). However, personalised learning as a

catalyst for system-wide reform is a new concept (Keamy et al., 2007) spurred on by the role digital technologies could potentially play (Conole, 2010). A number of education systems around the world acknowledge the potential of personalised learning. This is evident in government reports, curriculum documents and policy programmes in Australia (Ministerial Council on Education Employment Training and Youth Affairs, 1999), England (United Kingdom Department for Education, 2013), the United States of America (Association for Supervision and Curriculum Development, 2007), Canada (Ministry of Education, British Columbia, 2013) and New Zealand (Bolstad et al., 2012). Personalised learning in New Zealand is in a state of flux. It gained some ground as a way to lift student achievement (Maharey, 2006) and a recent investigation into personalised learning practices in New Zealand schools (Bevan-Brown et al., 2011) found that most schools recognised it as valuable, and described many ways to personalise learning effectively. However, wide variations in the depth of understanding of how to personalise learning were evident.

Personalising learning and digital technology

Recent advances in digital technologies have provided new tools for teachers and students to use to personalise learning (Demski, 2012; Watson & Watson, 2007). One rationale for using digital technologies to personalise learning is that students are already creating personalised learning environments outside school and they should have the same opportunities at school. These digital tools support AFL principles, enabling teachers to identify and manage the needs of many students, tailor content and resources for individual students, and access a large variety of interventions, content, resources, and learning opportunities (Abbey & Baylis, 2011). Learners who use technology have greater choice and control over their learning and can adapt the pace and depth of their study (BECTA, 2008). Some educators (Green et al., 2005) even argue that personalised learning cannot happen effectively without the right technological tools. One digital technology presented as a tool to personalise learning is an LMS (Watson & Watson, 2007.

Learning management systems

There are a variety of terms and associated acronyms to describe related, but conceptually different, e-learning platforms (Piña, 2013; Watson & Watson, 2007). For the purposes of this investigation, an LMS is an umbrella term used to describe one centralised cloud-based or server-based software program (Piña, 2013) that has the core purpose of enabling learning and teaching (Piña, 2013; Watson & Watson, 2007). Simply put, the LMS is an online program with a variety of features that support teaching and learning.

Current research on learning management systems

While LMSs have reached a high level of adoption in many countries, they are most prevalent in higher education institutions (Piña, 2013). Currently, there is a lack of research on LMSs in primary-school and pedagogical contexts. Of the school-related research that is available (Bergen, French, & Hawkins, 2012; Snodin, 2013), findings have shown how instructional and student-learning practices change as a result of the opportunities provided in an LMS. In a richer learning environment, teachers can take on a more facilitative role. An LMS can be used to assess traditional skills in new ways (Johannesen, 2013), with teachers supporting formative assessment practices such as the use of digital portfolios to support self-assessment and self-regulation. In a primary school context, Underwood et al. (2007) found that an LMS could be used appropriately to support personalised learning if it was used in the classroom.

In terms of AFL (the component of personalised learning that is the focus here), some researchers (Bergen et al., 2012; Johannesen, 2013) have shown that an LMS has the potential to support AFL practices and, indirectly, personalised learning. The most salient AFL principles are the ability to receive feedback and feed-forward (Benson, 2012; Snodin, 2013) and the potential

for the LMS to be a medium in which students can assess, reflect, and/or monitor their learning (Bergen et al., 2012; Johannesen, 2013). The LMS opens up opportunities to enhance teachers' perspectives about students (Benson, 2012). Additionally, the LMS can bring parents, students, and teachers together in the assessment process (Johannesen, 2013).

Notwithstanding the above, Watson and Watson (2007) argue that there is a shortage of research on LMS use in the compulsory schooling sector and they highlight the need for more large-scale classroom-based studies on implementing the LMS.

The study

This paper uses the dataset of a larger study (Edmunds, 2013) that explored the use of an LMS in a primary school, describing its role in personalised learning for students. Results presented and discussed here focus only on those data that related to the AFL component of the personalising learning framework (see Edmunds, 2013).

Case study

Case-study methodology enables researchers to gain a deep understanding of a situation and its meaning from those involved (Merriam, 2009), especially when describing 'how' or 'why' something takes place (Yin, 2013). A multiple-case-design approach was deemed suitable in this situation because an interpretation based on evidence from several cases can be more compelling than results based on a single instance (Yin, 2013). The unit of analysis in this project was the individual teachers who were personalising learning for their students.

The questions guiding the investigation are:

- What does personalising learning, specifically AFL, look like in a primary classroom with a Learning Management System as a core component?
- How are the teachers using a Learning Management System to personalise learning, specifically AFL?

Procedures

Ethical approval to undertake the study was gained before starting. Purposeful sampling (Merriam, 2009) was used to select suitable potential schools and interested participants. Criteria which guided site and participant selection are summarised in Table 1.

Table 1 The criteria which guided site and participant selection

Criteria for selecting potential school sites	Criteria for selecting participants
- is a primary school - uses the New Zealand Curriculum to inform teaching and learning - uses the LMS to support learning - is acknowledged by the 'wider' education community as an effective user of an LMS to support learning - is highly regarded by the LMS provider.	- is a classroom teacher - uses the school LMS (KnowledgeNET) as part of their teaching and learning programme - represents one year grouping (one participant from each year) - is a lead teacher within the school (on the ICT/ e-learning team; facilitator of the e-learning inquiry quality learning circles) - has presented at conferences

Data collection procedures comprised interviews, observations, and documentary information from the LMS, which included students' online work, teacher–student online conversations, and lessons and resources set up by the teacher. Two semi-structured interviews were conducted with each teacher. The first took place early in the investigation and the second was towards the end

of the research period. Three observations, spread throughout the project, took place in each teacher's classroom. Collection of LMS data occurred in 1-week blocks that coincided with each observation. Consent to observe the children and collect their work from the LMS was gained before the start of the data collection. Data collection began at the end of May 2013 and ran until mid-September 2013. [Editor's note: The New Zealand school year starts in February and ends in December.]

Because this was a multiple-case study there were two stages of analysis: the within-case analysis and the cross-case analysis. Each teacher was first analysed as an individual and comprehensive case, and this was followed by cross-case analysis. The data analysis phase commenced with open coding (Merriam, 2009) within the interview and observation transcripts. Sections of the coded data from the interviews and observation transcripts were then categorised according to the Personalising Learning Framework (PLF) (Edmunds, 2013), which listed components and specific features of personalised learning synthesised by the researcher during the literature review. Interview and observational codes that did not fit into the pre-established components on the PLF were noted and classified together as new themes emerged. For each week of the observations, the data evident in the LMS was also noted and categorised according to the PLF. This information was then compared with data from interviews and observations for cross-checking and triangulation.

Context and participants

Sunshine School (a pseudonym), which was used as the research site, is a medium-sized decile-6 primary school in inner-city Auckland, New Zealand. There are approximately 420 students from a variety of ethnic backgrounds, organised into four family or school teams: Whānau[1] One for children from New Entrants to Year 2; Whānau Two for Years 3 and 4; Whānau Three for children in Years 5 and 6; and Whānau Four, the school's Māori language and culture Immersion Unit for Years 1 to 6. All classrooms have interactive whiteboards (IWB), i-pads, a range of laptops, and access to digital cameras. The LMS used at Sunshine is KnowledgeNET.

Chris, Yvonne, and Lucie (pseudonyms) were the teacher participants in the research investigation. All of the students in the three teachers' classes were also invited to participate in the research project. In total, 88 of a possible 128 students chose to participate.

At the time of the study, Chris was a Year 5 and 6 teacher who had been teaching for 3 years, all in the current school. She was an e-learning co-leader and taught in a single classroom in the year of the research. Of a possible 25 students in this class, 18 chose to be participants in the project.

Lucie was a Year 3 and 4 teacher and the leader of literacy in the Year 3 and 4 Whānau team. She had been teaching for 10 years. This was Lucie's fifth year at this school. Lucie taught in a collaborative environment with another teacher, with both responsible for the teaching and learning in the two classes. Of a possible 52 students in these classes, 36 chose to participate in the project.

Yvonne was a Year 1 and 2 teacher and the leader of art and the New Entrants to Year 2 Whānau team. She was in her 19th year of teaching. She had been teaching at this school for 15 years, and full time for 7 years. Yvonne taught in a collaborative environment with one other teacher. Of a possible 51 students in this group, 34 students chose to participate.

---

[1] Māori word for family. Māori are the indigenous people of Aotearoa New Zealand.

Results

The cross-case findings are presented here as they relate to AFL as one aspect of personalised learning. Six of the principles of AFL (introduced earlier) became apparent in the findings across the teacher participants.

Using evidence to identify needs

Identifying student needs enabled the teachers to know what their students needed to learn to address their learning need. For example, Yvonne "assess[ed] and observe[d] the children", identifying their strengths and weaknesses (Interview 2). Lucie described how this worked for her in reading. She spoke about how she had "chosen inference and predicting" as student goals in reading as she "found at the end of testing last term that there was a real need for the same sort of skills … and so that's why I made it a focus" (Interview 2).

All three teachers used information posted by students in the LMS to gain additional insight into what they had learned and what they needed to learn next. Teachers used the student response to their goals and/or asked specific questions in the LMS to gain information about student needs. Figure 1 shows responses to a question about prediction.
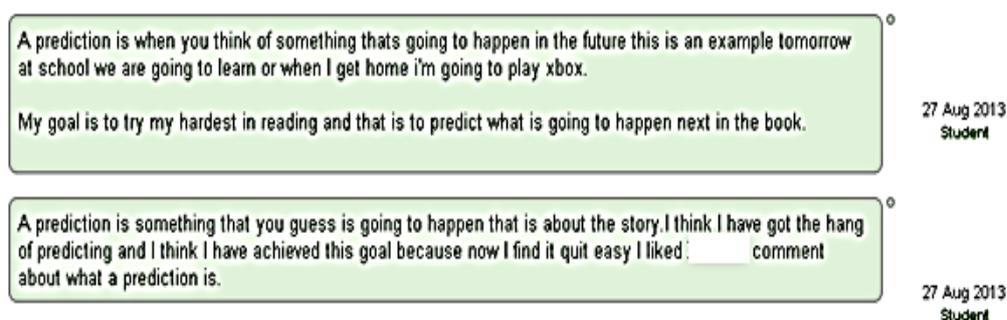
A prediction is when you think of something thats going to happen in the future this is an example tomorrow at school we are going to learn or when I get home i'm going to play xbox.

My goal is to try my hardest in reading and that is to predict what is going to happen next in the book.

27 Aug 2013
Student

A prediction is something that you guess is going to happen that is about the story.I think I have got the hang of predicting and I think I have achieved this goal because now I find it quit easy I liked.   comment about what a prediction is.

27 Aug 2013
Student

Figure 1 Student response to teacher's question, posted in the LMS

Chris and Yvonne were also taking steps to involve students more in the process. For example, during writing, Chris worked with students as they assessed samples of their instructional writing against their writing goals, reflecting on progress and identifying their next steps for learning.

Communicating student needs

All three teachers communicated student needs as student goals and success criteria, posting these goals into the LMS for students and parents (see Figure 2). Chris explained, "The goals would be something like, 'we are learning how to solve percentage problems' … and then there would be seven steps, like 'I cans' under that. Like there is a WALHT[2] and there is obviously the success criteria which are 'I cans' " (Interview 1).

---

[2] We Are Learning How To: This is the learning intention for a lesson or series of lessons. It is a statement that describes clearly what the teacher wants the students to know, understand, and be able to do as a result of learning and teaching.

Selected Topic: Personal - 2013 reading-understand what i have read

Description

WALHT: understand and make inferences about a story.

Reflection/Goals

I can:
- Think about the story.
- Read between the lines.
- Use clues from the story.
- Think of what the author doesn't say.
- Make predictions about what the author is trying to say based on my experiences using the clues that the author provides.

Figure 2 Student learning goal and success criteria observed in the LMS

Yvonne and Chris also supported students to place their learning goals in the LMS. For instance, Yvonne was observed working with a group of students to enter their goals and success criteria into the LMS (Observation 2). In contrast, Lucie entered the goals for her students and had them review them as part of the learning process. Lucie explained that when students entered their goals it was "taking up just a lot of teacher time and we didn't really see the value in it". Lucie acknowledged that "Ideally they [learning goals] would be, with AFL pedagogy, more student-directed" (Interview 1). This suggests that Lucie was yet to make the connection between the importance of students being involved in the process of learning and entering their own learning goals in the LMS as a specific feature of personalised learning.

Differentiated instruction to meet student needs

All three teachers grouped students according to their identified needs and designed learning experiences to meet these needs. Chris explained how the learning goals informed most of the learning that happened in class, as "typically we will learn the stuff in our goal" (Interview 1). Lucie emphasised how "We are looking at those goals and talking about those goals every day and thinking about the success and how we're going to achieve those goals" (Interview 2). Each teacher worked with different groups of learners throughout the sessions, and the work focused on a specific learning intention.

The learning goals also informed most of the learning that happened in the LMS. Chris designed the LMS so "the learning journey is linked to the learning journal which is linked to the learning links" (Interview 1), with these links "based on our goal and based on our learning" (Interview 2). In Interview 1, Lucie outlined how she created "learning links for each of the groups" in the LMS where they "have their learning intention for that week, and then they might have three different hyperlinks that they can go into, and they can practice that skill … they choose what they want to do". In contrast, Yvonne had a learning links page set up in the LMS for literacy which was "based on their ability groups and they have got links set up according to their needs. So, for example … one group's learning phonics. So I have a link to a phonic song for them to practice and listen to" (Interview 1). However, this page did not change over the duration of the LMS observations (July through August) indicating that it was not adjusted to meet the changing needs of students.

Lucie and Chris also had a number of learning links pages set up in their class areas of the LMS for reading, writing, and maths. Most of these pages had a learning intention and success criteria at the top of the page, followed by an activity. Chris used the comment feature to ask some questions that the students were required to answer. Lucie explained that the learning links

changed "depending on whether they have achieved the learning intention" (Interview 1). Figure 3 is an example of a learning links activity in Lucie's class area.

Goal reflection
We have been learning about prediction. Write how you think you are going with your goal. Have you achieved it or do you think you need more work on it?

| 4 | WALHT infer the hidden meaning | Watch each clip and think about the questions below. Discuss your answer with a buddy.

Video A
What is inferring like?

Video B
Which 2 clues do they discuss that can help you to infer?

Video D
Which clues did she use this time to help her infer? |
| 5 | WALHT infer the hidden meaning | Guess the riddle - Guess the object by clicking on the clues

Multi choice - Read the passage and choose the correct inference

Pop-ups - Choose the correct answer from the drop down box |

Figure 3 Learning links activity for a reading group in Lucie's class area

Ongoing monitoring to inform planning

The teachers monitored student learning, modifying their classroom programme to reflect what they had learned about student needs. Lucie explained this:

> There's continual check-in through that goal to see how you're going or through that learning intention … I have found from initially what you think … is going to be their goal, when you get into it you might actually need to go backwards in order to go forwards, or sideways in order to go forwards. (Interview 2)

The teachers often ended their group sessions with a form of reflection to gain insight into the students' learning.

The LMS tools were used to help teachers to gain insight into what was happening for the students. Yvonne explained:

> You have got your weekly reflection, your learning journal, your goals and all of that evidence … [and you] see their comments and understand what they have learnt. And then for me to look at my planning and go, 'Ok, this group of children needs that learning intention, or needs more work on that area'. So I can pick that group of children up. In a sense that is personalising their learning from what they tell me. (Interview 1)

Lucie (Interview 2) and Chris (Interview 2) also explained how they tried to use entries and information in the LMS to inform their planning to cater for the students' learning needs. The LMS tools the teachers used included learning reflections (Chris, Lucie, and Yvonne), learning

links questions (Chris, Lucie) and learning journals (Chris, Lucie, and Yvonne). The extent and the way each tool was used varied between teachers.

Each teacher posted reflective questions to the learning reflections section in the LMS to get a glimpse into how students were progressing with different aspects of their learning. Learning reflections included a series of questions which students responded to and were designed to "get them thinking about what they are actually doing" (Chris, Interview 2). Figure 4 shows the Art Week reflection posted by Lucie. Yvonne also found it beneficial that everyone could see what they had learned in the LMS, including tricky collaborative work, and that parents could observe it too.

Topic: Art week reflection

Action ▾

Topic: Art week reflection

Last week was art week. Tell us ...

1. what you learnt
2. what you found challenging
3. what you were most proud of
4. if you were to do it again, what changes would you make

I'm looking forward to reading all about your experiences

Posts:

1. what you learnt
I learnt how to paint carefully
2. what you found challenging
I found makeing the corners smooth very tricky
3. what you were most proud of
I am most proud of picking the object in front of my face
4. if you were to do it again, what changes would you make
I would over lap my arms cause the paint would not cover the blue wich means i need to make it more thick!

Figure 4 Art Week reflective questions posed by the teacher, and a student response

Insight into student learning was also gained from the learning links area in the LMS. Chris spoke about how she was now making reflections more focused, especially in the LMS, so she could base the workshops "on what we can see as weaknesses or what they've [students] identified as weaknesses" (Interview 2). Chris asked a series of questions based on a persuasive writing online activity (see Figure 5) which gave her insight into how the students had understood these concepts. The responses are shown in Figure 6.

Figure 5 Learning links activity on persuasive writing placed in the LMS by Chris

I got 100%
1. What is persuasive writing? What is the writer trying to do?
the writer is trying to convince you to do something
2. Give an example of an argument/persuasive writing?
uniforms
3. Give 3 reasons why or why not you think we should have longer play times.
no or yes no 1 because you waste your time, 2 because you won't learn much and might become a hobo,
3 because you can have more time to do or finish your stuff that your teacher tells you. yes because you
can have a longer playtime, 2 so you can rest more and be lazy, 3 so you can finish your eating.

Step 3: Answer the following questions in the comments section below.

1. What is persuasive writing? What is the writer trying to do? It is getting you to do or try something, the
writer is persuade you to buy stuff
2. Give an example of an argument/persuasive writing? want a nice cool treat then buy froyo ice cream

3. Give 3 reasons why or why not you think we should have longer play times.
1- I think we should because it is nice for the teachers to have tiered and not loud and noise
2- I think we should not because then we don't learn as much
3-It is usally wet out side so no.

Figure 6 Learning links activity and responses in the LMS from students to a group writing activity

Chris and Yvonne also used learning journals in the LMS. Chris explained that learning journals were "Basically a place where students can post evidence, like pieces of work, or videos of themselves, reflections, different things … in reading, writing and maths" (Interview 1). For Chris, these were linked to "their learning intention for the week. And basically, that's typically linked to the goal". Yvonne used learning journals for students to share their writing: "Where children go in, type their writing … if they are not finished they can continue working at home" (Interview 1).

Effective feedback and feed-forward

All teachers spoke of the importance of effective feedback and feed-forward to support personalised learning. The LMS provided an opportunity for students and Chris to comment on learning that was posted. In Interview 2, Chris told how "commenting on peers' work" was often an activity on the class contract and that she "tend[ed] to do it throughout the week and then go in little snippets". All of the comments related to learning. Figure 7 is an example of comments by Chris and a student on another student's play.

Comments

enjoyed your play about the Ant and the Grasshopper. You clearly let me know the setting and the dialogues between characters. We probably need to focus more on using stage directions so that the people acting out your play know what to do.

17 Sep 2013
Teacher

i enjoyed the play but maybe you could use some stage directions

18 Sep 2013
Student

Figure 7 Comments by Chris and a student on another student's play

One way of providing feedback, Yvonne explained, was "one-to-one conferencing … we looked at the comments [in the LMS] … how can you make your paragraph stronger? Your ideas

stronger?" (Interview 2). In the LMS, Yvonne talked about how learning journals are a great place for students to get feedback: "I read the journals, I comment on it and they make improvements in their writing" which meant that "children are empowered to write more. There is lots of different feedback given to them, so it's not just a teacher". (Interview 1)

While teachers valued feedback and feed-forward, it was spasmodic in practice.

Students reflecting on learning

All of the teachers ensured that students reflected on their goals at the end of the term. Yvonne described how "it should look like what they have achieved or partly achieved in that goal and what they still need to work on for that goal" (Interview 1). They work this out "by looking at evidence" from their learning journal (in the LMS), workbooks, class modelling book, and "snapshot and video record the evidence" (Interview 1).

Each teacher modelled some aspect of goal reflection before the students moved it to the LMS. For example, in Observation 1 Yvonne worked with a writing group, "learning to assess and reflect on our report writing". She modelled the process on the IWB, taking the students slowly through the process of marking on a report writing assessment sheet and then seeing what they needed to work on next time. A pdf of this sheet, which included the teacher's marking, was then uploaded to each student's writing goal in the LMS. This is shown in Figure 8.
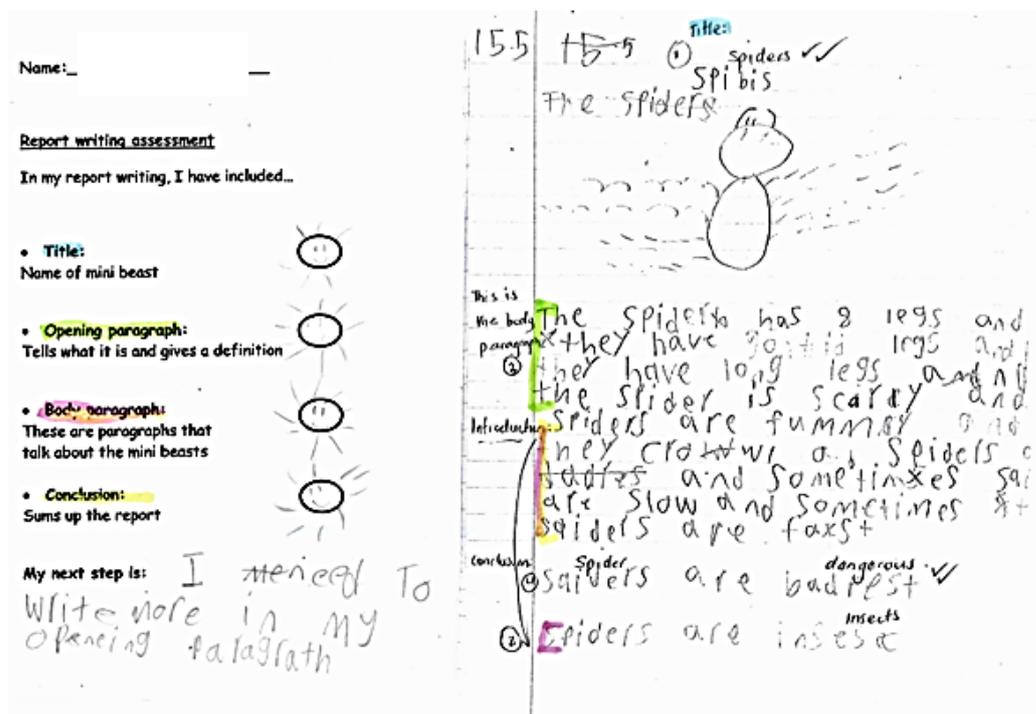

Figure 8 Term 2 writing assessment sheet uploaded into the LMS for a student in Yvonne's class

Lucie supported students to reflect on how they had progressed towards their goal once they had achieved it, which was usually at the end of the term. Reflecting on learning showed that they "understand it and can talk about it and can do it" (Interview 2). There were 51 student comments in the LMS in the key week that they met individually with Lucie. The writing goals were written comments with a PDF example of their work, as shown in Figure 9.

Figure 9 Writing goal evidence, and student and teacher comments

The LMS also provided students with a variety of ways to communicate their learning. They were able to use audio, video, or type functions to respond to questions, post reflections and upload evidence. Yvonne said that her students mostly "choose to use video and they talk about their learning, they record it. So they do it all by themselves" (Interview 1).

Discussion

Analysing the approaches teachers used to scaffold their classroom programme, and the way they structured the LMS, indicate that teachers favoured AFL principles as a key way to personalise learning for students, both in the classroom and in the LMS. Each teacher spoke about the role AFL played in enabling them to identify the learning needs of each student to guide the design of learning experiences. Six principles of AFL emerged in the findings for each of the teachers: (a) using evidence to identify needs, (b) communicating student needs, (c) differentiating instruction to meet student needs, (d) using ongoing monitoring to inform planning, (e) providing effective feedback and feed-forward, and (f) enabling student reflection on learning. The degree to which these were evident varied amongst the teachers.

Using evidence to identify needs

All three teachers used a variety of assessment practices and evidence to identify learning needs. Both formal and informal assessments were used by the teachers, including evidence gathered from the LMS learning reflections, learning links, and uploaded evidence of learning.

Previous research (Hargreaves, 2004; Maharey, 2006) has highlighted that AFL is a key approach for personalised learning as it enables the use of evidence and dialogue to identify strengths and weaknesses of every student. The findings presented here reflect this and the role played by the LMS. Once teachers had identified the needs of the students by using a variety of

formal and informal assessments, they communicated these needs to students and caregivers via the LMS.

Communicating student needs

Each teacher communicated student needs as student goals and success criteria, and posted these goals in the LMS. This practice aligns with the views of other researchers Besley &Sokoloff, 2004) who argue that personalised learning relies on students knowing their learning goals and what to do to get there. Negotiating goals with students and involving them in the process is also seen as important (Ruddick, Brown, & Hendy,2006; West-Burnham, 2010).

Once student needs had been identified and communicated, they were used to provide the foundation of learning experiences in the classroom and the LMS.

Differentiated instruction to meet student needs

The teachers grouped students according to their identified needs, and then designed learning experiences to meet these needs. The teachers managed this through small-group sessions and by designing learning activities in the LMS that linked to their learning. Additionally, the teachers ensured that they spent some time each session checking in with individual students.

Making the learning fit the learner—not the learner fit the learning—is essential to personalised learning (Wilmot, 2006). Using knowledge about what a student needs to learn, 'feeds-forward' to help the student learn more productively (West-Burnham, 2010). It also contributes to the process of student learning by enabling the teacher to adjust teaching and planning for learning progression. This approach corresponds with research which suggests that effective grouping, with flexible and in-class groupings, is the best way to ensure effective learning (DfES, 2008). This appeared to be the case for these three teachers, who were using differentiated instruction to meet student needs both in the classroom and in the LMS.

As part of the cycle of teaching and learning, the teachers continually monitored student progress and gained insight into the learning process. They modified learning experiences to meet the changing needs of students.

Ongoing monitoring to inform planning

While addressing student needs via their goals, the three teachers also monitored student learning, modifying their classroom programme to reflect what they had learned about student needs. The LMS tools were used to assist teachers in gaining insight into what students required.

This approach corresponds with other research (August, et al., 2007) which found that any strategy to personalise learning must focus on improving the consistency of high quality teaching to meet student needs by building on a student's prior learning. One way to do this was through regular monitoring to plan next steps. Bergen et al. (2012) also found that LMSs help teachers to develop opportunities for student assessment. This was the case for these three teachers, who were using alternative forms of assessment within the LMS.

Effective feedback and feed-forward

The teachers spoke of the importance of effective feedback and feed-forward to support personalised learning. They spoke of the additional opportunities afforded by the LMS to provide students with effective feedback and feed-forward from teachers, peers, and caregivers. The importance of effective feedback and feed-forward is supported by Bergen et al. (2012) who reported that an LMS opens up new ways of interaction, enabling students to know where they are at, their next learning steps, and how to get there.

Nevertheless, a conflict was evident between what the teachers valued and spoke about in the interviews, and the evidence in the LMS at the time of the observations. Across the observation periods, minimal feedback and feed-forward was seen, indicating that it was rarely used throughout the process. Students were also afforded the ability to give feedback to other students, yet this was not common in practice. Insights into why this was the case were not specifically addressed in the research.

Students reflecting on learning

The teachers encouraged students to reflect on their learning throughout the learning process as a way to monitor student learning, modifying their classroom programme to reflect what they had learned about student needs. The ways in which students reflected on the goals varied between classes but included, at a minimum, some evidence of learning in the form of videos, pdf scans, or photos. In addition, each of the teachers responded to student goals.

Providing opportunities for reflection also enabled student voice to be heard. Teachers in this study provided opportunities in the classroom and in the LMS for students to express their opinions about, and to share, their learning. Rudduck et al. (2006) also reported that listening to student voice enables students to feel valued and empowered—an important feature of personalised learning.

Conclusion

As a small-scale qualitative study, the intention of this research was not to generalise the findings to other contexts, nor to make general statements about the nature of personalised learning. Notwithstanding these limitations, the key finding from this research is that an LMS has the potential to be a key aspect of a classroom environment that is built on the components of personalised learning, particularly in supporting AFL principles.

In the research described here, personalised learning involved learning built on AFL pedagogy and a highly structured approach to learning and teaching that places the needs of students at the centre of learning. Specifically, in terms of AFL, the LMS and classroom practice centred on using evidence to identify needs, communicating student needs, differentiating instruction to meet student needs, providing effective feedback and feed-forward, and enabling student reflection on learning.

The key message from this research is that the teachers saw the LMS as a tool for learning and the way that it was used generally aligned with the pedagogy that was being used in the classroom. Because AFL was the scaffold upon which classroom learning was designed, it was also the framework within which the LMS was designed and used. Ultimately, the LMS was used as a tool to address the learning needs of students and, in so doing, supported both AFL pedagogy and personalised learning for students.

Personalised learning has the potential to transform education and is being promoted as an essential component of future-oriented teaching and learning. Digital technologies, such as an LMS, have potential too—the potential to bring parents into the learning process, to hear student voice, and to harness new ways of learning. For that potential to be achieved, more needs to be known and understood about how digital technologies can support and enhance personalised learning principles. This research represents an important step in that process.

Acknowledgements

References

Abbey, N., & Baylis, A. (2011). *Personalised learning: Round table discussion*. Summary report 2011. Retrieved from http://www.viccso.org.au/userfiles/files/Personalised_Learning_Report_2011_FINAL_April_2 012.pdf

Assessment Reform Group. (2002). *Assessment for learning: 10 principles—Research-based principles to guide classroom practice*. Retrieved from http://assessmentreformgroup.files.wordpress.com/2012/01/10principles_english.pdf

Association for Supervision and Curriculum Development. (2007). *The learning compact redefined: A call to action*. A report of the Commission for the Whole Child. Retrieved from http://www.ascd.org/ASCD/pdf/Whole%20Child/WCC%20Learning%20Compact.pdf

August, K., Brooks, R., Gilbert, C., Hancock, D., Hargreaves, D., Pearce, N., … & Wise, D. (2007). *2020 vision: Report of the Teaching and Learning in 2020 Review Group*. Retrieved from http://dera.ioe.ac.uk/6347/1/6856-DfES-Teaching%20and%20Learning.pdf

Benson, J. (2012). *An investigation into the effectiveness of an IT-based learning management system to support learning in a New Zealand primary school.* Master of Philosophy, Curtin University, Perth.

Bergen, A., French, L., & Hawkins, L. (2012). *Teaching and learning in a digital world: A developmental evaluation of virtual learning environments in the Upper Grand and York Region district school boards*. Retrieved from www.theresearchshop.ca/resources

Besley, S., & Sokoloff, P. (2004). *Personalised learning: Just what is it?* Retrieved from http://bendigoeducationplan.wikispaces.com/file/view/PL_what_is_it.pdf

Bevan-Brown, J., McGee, A., Ward, A., & MacIntyre, L. (2011). Personalising learning: A passing fad or a cornerstone of education? *New Zealand Journal of Educational Studies, 26*(2), 75–88. Retrieved from http://search.informit.com.au/documentSummary;dn=956593406382955;res=IELHSS

Bolstad, R., Gilbert, J., McDowall, S., Bull, A., Boyd, S., & Hipkins, R. (2012). *Supporting future-orientated learning and teaching: A New Zealand perspective.* Report to the Ministry of Education. Retrieved from http://www.educationcounts.govt.nz/publications/schooling/109306

Bray, B., & McClaskey, K. (2013). A step-by-step guide to personalise learning. *Learning & Leading with Technology, 40*(7), 12–19.

British Educational Communications and Technology Agency. (2008). *Harnessing technology: Next generation learning. 2008–2014*. Retrieved from http://webarchive.nationalarchives.gov.uk/20101102103654/publications.becta.org.uk/display. cfm?resID=37348

Conole, G. (2010). Personalisation through technology-enhanced learning. In J. O'Donoghue (Ed.), *Technology-supported environments for personalized learning: Methods and case studies* (pp. 1–15). Hershey, PA: IGI Global.

Demski, J. (2012). This time it's personal. *The Journal: Transforming Learning through Technology*. Retrieved from http://thejournal.com/Articles/2012/01/04/Personalized-learning.aspx?Page=1

Department for Children, Schools and Families. (2008). *Personalised learning: A practical guide*. Retrieved from http://webarchive.nationalarchives.gov.uk/20130401151715/http://www.education.gov.uk/publications/eOrderingDownload/00844-2008DOM-EN.pdf

Edmunds, B. (2013). *Using an online learning managment system to personalise learning for primary students.* Master of Education, Massey University, Palmerston North.

Green, H., Facer, K., Rudd, T., Dillon, P., & Humphreys, P. (2005). *Personalisation and digital technologies*. Retrieved from http://halshs.archives-ouvertes.fr/docs/00/19/03/37/PDF/green-2005-Personalisation.pdf

Hargreaves, D. H. (2004). *Personalising learning: Next steps in working laterally*. Retrieved from http://actionlearning-knox.wikispaces.com/file/view/Next+steps+in+working+laterally+-+Chapter+1.pdf

Interface Magazine. (2009). Ministry invests in standards-based LMS. *New Zealand Interface Magazine,* (13). Retrieved from http://www.nz-interface.co.nz/articles.cfm?c_id=15&id=47

Johannesen, M. (2013). The role of virtual learning environments in a primary school context: An analysis of inscription of assessment practices. *Computers & Education, 44*(2), 302–313. doi:10.1111/j.1467-8535.2012.01296.x

Keamy, R. L., Nicholas, H. R., Mahar, S., & Herrick, C. (2007). *Personalising education: From research to policy and practice*. Retrieved from http://www.eduweb.vic.gov.au/edulibrary/public/publ/research/publ/personalising-education-report.pdf

Maharey, S. (2006). *Let's talk about personalising learning*. Retrieved from http://www.correspondence.school.nz/departments/esection/students/connect.ed/web/prodev/elearning%20papers/personalising-learning.pdf

Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.

Milibrand, D. (2004). *Personalised learning: Building a new relationship with schools.* Paper presented at the North of England Education Conference, Belfast, Ireland. Retrieved from http://schools.cbe.ab.ca/b352/pdfs/PersonalizedLearning_Building.pdf

Ministerial Council on Education Employment Training and Youth Affairs. (1999). *National goals for schooling in the 21st century*. Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/Previousproducts/1301.0Feature%20Article232001?opendocument&tabname=Summary&prodno=1301.0&issue=2001&num=&view

Ministry of Education. British Columbia. (2013). *Personalised learning in BC: Interactive discussion guide*. Retrieved from http://www.personalizedlearningbc.ca/book_image/PersonalizedLearningBC.pdf

Ministry of Education. (2012). *Managed learning environments*. Retrieved from http://www.minedu.govt.nz/NZEducation/EducationPolicies/Schools/Initiatives/ManagedLearningEnvironments.aspx

Piña, A. A. (2013). Learning management systems: A look at the big picture. In Y. Kats (Ed.), *Learning management systems and instructional design: Best practices in online education* (pp. 1–19). Hershey, PA: IGI Global.

Rudduck, J., Brown, N., & Hendy, L. (2006). *Personalised learning and pupil voice: The East Sussex project*. Retrieved from http://www.ttrb3.org.uk/personalised-learning-and-pupil-voice-the-east-sussex-project/

Snodin, N. S. (2013). The effects of blended learning with a CMS on the development of autonomous learning: A case study of different degrees of autonomy achieved by individual learners. *Computers & Education, 61*, 209–216. doi:10.1016/j.compedu.2012.10.004

Treadwell, M. (2008). Our life: Our learning. In M. Treadwell (Ed.), *The conceptual age and the revolution: School v2.0* (pp. 108–114). Heatherton, Australia: Hawker Brownlow Education.

Underwood, J., Baguley, T., Banyard, P., Coyne, E., Farrington-Flint, L., & Selwood, I. (2007). *Impact 2007: Personalising learning with technology*. BECTA. Retrieved from http://webarchive.nationalarchives.gov.uk/20110130111510/http://research.becta.org.uk/index.php?section=rh&catcode=_re_rp_02&rid=14202

United Kingdom Department for Education. (2013). *2014 National Curriculum*. Retrieved from http://www.education.gov.uk/schools/teachingandlearning/curriculum/nationalcurriculum2014

Watson, W. R., & Watson, S. L. (2007). What are learning management systems, what are they not, and what should they become? *TechTrends, 51*(2), 29.

West-Burnham, J. (2010). *Leadership for personalising learning*. Retrieved from http://dera.ioe.ac.uk/2127/1/download%3Fid%3D17239%26filename%3Dleadership-for-personalising-learning.pdf

Wilmot, E. (2006). *Personalising learning in the primary classroom: A practical guide for teachers and school leaders*. Bancyfelin: Crown House.

Wolf, M. A. (2010). *Innovate to educate: System [re]design for personalised learning*. A report from the 2010 symposium. Paper presented at Innovate to Educate: System [Re]design for Personalised Learning, Boston, MA.

Yin, R. K. (2013). *Case study research: Design and methods* (5th ed.). Los Angeles: Sage.

Biographical notes

Bronwyn Edmunds MEd
brone@freemansbay.school.nz

Bronwyn is a teacher in Freemans Bay School, New Zealand, where she works with teachers and students, helping them to use ICT to support the teaching and learning process embedded in effective teaching theory. She is passionate about the potential of effective learning to ignite and engage students and develop skills and values to be lifelong learners. She enjoys sharing her skills and knowledge with others in ways that are easily transferable into the classroom.

Maggie Hartnett PhD

m.hartnett@massey.ac.nz

Maggie is a lecturer in the Institute of Education at Massey University, New Zealand, where she teaches in the areas of e-learning and digital technologies. Her research interests include motivation and engagement in digital environments, teaching and learning with digital technologies, electronic portfolios, support for digital learners, digital places, and spaces of learning. Maggie is also an Associate Editor of the *Journal of Open, Flexible and Distance Learning*.

Edmunds, B., & Hartnett, M. (2014). Using a learning management system to personalise learning for primary school students. *Journal of Open, Flexible and Distance Learning, 18*(1), [11–29].