Chapter 5
Online Assessment and Learner Motivation in the Twenty-First Century

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5.1 Introduction

Learners in the twenty-first century are technology literate and connected to their peers in ways that were inconceivable a generation ago. These attributes offer unique opportunities to foster deep engagement and enhance learning in higher education. This chapter explores some of the ways that online assessment tasks, in particular those involving peer interaction, can be designed to activate learner motivation. Alignment with the core elements of motivation, i.e., attention, relevance, confidence, and satisfaction is a critical factor.

Educational researchers identified the pivotal role of these four elements of learner motivation more than 30 years ago (e.g., the attention, relevance, confidence, and satisfaction (ARCS) model, Keller 1987). However, the eLearning tools and pedagogical strategies available to activate them in the shifting circumstances of higher education in the 1980s were less versatile and less mature than they are today. Class size and student diversity were increasing while resources available for teaching were diminishing. Positive forces included rapid advances in both the knowledge base for learning and the affordances of technology in learning design. These factors combined to create new opportunities to apply emergent theoretical principles in teaching and learning to stimulate motivation for the current generation of learners. As the knowledge base expanded, researchers (e.g., Alderman 2004) identified the social dimension as a fifth core element of motivation. This "fifth dimension" is proving to be a powerful force in the era of blended and online learning.

Online assessment is an important feature of twenty-first century learning environments that can be used to activate motivation in various direct and indirect ways. Many developments in this area have resulted from implementation of strategies to promote active learning in large classes, and to meet the needs of learners with diverse educational backgrounds. Research shows that well-designed

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assessment tasks can act as a catalyst for learning (Draper 2009) by focusing learner attention and demonstrating relevance, thus addressing two key elements of motivation. It also shows that students are using feedback in ways they previously did not (Fearn 2011), suggesting that they have come to appreciate the value of this part of the learning process as their lecturers always intended. One reason for this shift in learner perceptions is the timely and constructive nature of feedback delivered by online systems, and the way this addresses the confidence and satisfaction elements of motivation. The power of the social dimension is both greater and more accessible in the online environment. The learning processes triggered by online assessment are more complex and diverse than this brief outline can portray. Further research is needed to identify the full range of motivational influences at play. Initial studies reveal high potential, and the aim of this chapter is to illustrate just a few of the many examples.

The chapter begins with a brief outline of current theoretical perspectives on learner motivation and the affordances of technology for assessment practice. It then presents examples of online assessment designs to explain how they align with the elements of the ARCS model described by Keller (1987) and the social dimension of motivation identified by Alderman (2004). Design features of tasks to engage learner attention and demonstrate relevance are presented, along with ways to use system-generated responses, and peer and lecturer feedback to develop confidence and provide satisfaction.

The tools available for online assessment range from very basic to highly sophisticated. The examples in the chapter reflect some of this range. Options include student-generated content and tasks, rubric-driven peer reviews and marking assistants, along with more traditional multichoice and mastery learning designs. The affordances of the current generation of online assessment tools were not available when researchers first identified the core elements of learner motivation, and it is unfortunate that findings from early research are often written off as irrelevant to the current context. In fact, they are the foundations of evolving knowledge, and remain as relevant today as they were at the start. It is the range of opportunities to apply and extend these core principles that has changed beyond imagination. A critical factor now is to acknowledge the key role that these core elements play in the design and use of online assessment tasks to motivate and engage twenty-first century learners.

5.2 Perspectives on Learner Motivation

Motivation in learning is a difficult topic to research, because it is multidimensional, abstract, inconstant, and cannot be directly observed (Dornyei 2001, p. 185). However, Keller (1987) proposed that the challenge of stimulating motivation in learners could be made more predictable and manageable with strategies designed to address four basic requirements, i.e.:

- Attract and focus learner attention
- Demonstrate the relevance of activities to learning goals
- Build confidence by managing expectations
- Offer satisfaction through feedback on performance

It may be more appropriate to consider these requirements as interlinked elements of learning design than separate categories as Keller presented them in the ARCS model. Besides being a useful focus for learning design these are dimensions that designs can be measured against with a particular target audience in mind. This kind of measurement has become more of a challenge, as knowledge about target learners is less accessible in large or online courses and now, of course, in massive open online courses (MOOCs). While this challenge remains current, a broadly useful design aim is to offer flexibility to interpret learning and assessment tasks within a context of personal relevance. For example, a task to design a business plan may be based on common principles but allow a personal choice of focus, a website design project allow choice of content and purpose, or questions be chosen for difficulty or relevance to personal learning goals. This kind of flexibility can help to focus attention and foster relevance through a degree of choice.

Svinicki (2004) found power in the relationship of interest and attention as a force to direct learning effort. She described motivation as the force that helps learners to persist when they encounter obstacles, and to know when they progress past them. She believed that motivation is contingent upon the value attached to an expected outcome as a means to satisfy a need, either for its intrinsic value or as a contribution to achievement of a higher goal. She introduced further dimensions of learner choice and control, and the ability to influence or affect the opinions of others as part of an individually defined value proposition that underlies motivation.

This brief sketch only hints at the dramatic change in beliefs about motivation that has taken place in recent decades, and of the challenge in researching the topic. The chapter does not aim to present a full account of research on learner motivation for reasons of space and focus. For those wishing to explore the topic further, the work of Keller (1987), Dornyei (2001), Alderman (2004), and Svinicki (2004) provide useful insights. Many researchers have noted the importance of assessment as a source of motivation and a catalyst for learning. The chapter now moves on to explore the role of technology in this proposition.

5.3 Affordances of Technology for Assessment

Evidence of the benefits of various forms of online assessment has grown in both volume and scope in recent years (e.g., O'Reilly 2001; Gunn 2006). While the potential has been recognized for some time now, the affordances of emergent technologies have to be fully explored before skeptical faculty members are prepared to explore and adopt them. It is unfortunately common for hype and unrealistic expectations to accompany the launch of new technologies, and online assessment is no

exception. While early trials can produce quick and useful results, design for specific contexts and evaluation of strategies in use takes time. Many researchers use a cyclical process of design, implementation, and evaluation to produce evidence of educational value (e.g., McKenney and Reeves 2012). So there is usually a fairly long gap between publication of results of initial trials and widespread productive use of new technologies in a range of learning contexts. The situation is further confounded by constant change as new technologies continue to evolve, and by the interdependence of technology and other aspects of learning design. Transformation of practice is usually a slow and systematic process that lags behind the expectations created by overoptimistic media and technology providers.

O'Reilly (2001) illustrated this point by noting that online assessment had failed to produce the expected improvements in learning because assessment design had not adapted to the unique context of online learning. She concluded that learning objectives, activities, and assessments needed to be better aligned to maximize the potential of new tools. This was less a reflection on the quality or capability of the tools than a situation where emergent understanding of both learning design and the affordances of online tools was still being explored. Bull et al. (2002) reported similar findings in a review of online assessment practice across the UK higher education sector. While potential benefits were fairly widely recognized, challenges associated with the evolutionary nature of the field and an "ad hoc" approach to development at institutional level would be difficult to address. Both these sources acknowledge the challenge of integrating online assessment into course and learning designs. This adoption "problem" requires institutional action and professional support as well as changed pedagogy (Clark and Herd 2003). While contextual factors such as these are important, they are also too broad to address in a chapter focused on presenting evidence of motivational influence. Examples of such potential are now outlined.

5.4 Motivation in Mastery Learning Online

While mastery learning is sometimes judged to be "less effective" than learning based on, e.g., a social constructivist model, it is, like the core elements of motivation, an important building block for deeper and higher level learning in many subjects. Science and second-language learning are the two examples featured here. Students must learn complex vocabulary, basic rules, principles, and processes before they can proceed to apply this knowledge to more complex problems or tasks. Back in the 1990s, attempts to promote mastery through more conventional means were proving particularly challenging in the context of increasing scale and diversity in classrooms. The possibility of designing online systems to facilitate the acquisition of core knowledge through a mastery approach began to be explored. Such systems have been under development and in production for many years now, and some can be sourced in a package with textbooks from commercial publishers. They are also fairly easy to produce with basic development tools, or to acquire

free of charge from third-party sources. Like any learning medium, they are not designed to stand alone, but as an integral part of a multidimesional, active learning environment. Most of the online mastery learning systems are based on quizzes and multichoice questions. They come in varying levels of simplicity and sophistication, from basic drill and practice to intelligent adaptive systems that analyze learner behavior to develop better tasks and provide personalized feedback and pathways. The motivational influences of these systems are also quite simple, though very powerful (Table 5.1).

Gunn and Harper (2007) found the use of simple quizzes and feedback helped the students to form clear expectations of the level of knowledge and performance that was required. Online assessment helped to solve learning problems that had previously been identified when it was already too late to help students to lift their achievement levels. Fairly simple quizzes were used along with lectures and tutorials to allow them to reinforce learning in ways more likely to impact on long-term memory. O'Reilly's (2001) description of the benefits of well-designed online assessment promotes the use of this method and mastery learning approach. Similar findings have emerged from studies of language learners (Brussino and Gunn 2008). In both cases (science and language learning), the addition of dynamic multimedia resources further enhanced learner choice of task, and increased appeal to those students with more visual learning styles within a mastery learning system design. The articles cited in this section show how these activities impacted on learning and final grades.

Table 5.1 Motivational influences in mastery learning

Motivational aspect	How addressed
Attention	Learners can typically choose when, where, and how often to engage (voluntary attention), rather than having these aspects determined by a class schedule or teacher availability. They can move around topics and levels in a flexible and self-directed manner to focus on personal learning goals or challenges
Relevance	Learners may be able to choose a level of difficulty or a type of problem that best suits their abilities and learning goals. They may also be able to choose from a range of topics to align with their own interests
Confidence	Perhaps the most important feature of mastery learning online assessment systems is the immediate feedback learners receive on their performance, and the way this helps to build confidence and expectations. Feedback can direct them to the source of material or tasks that will address knowledge gaps or misconceptions that may be present. The range of learning design options is broad, and the choices considerable, even within highly structured mastery learning situations. This helps to build confidence and autonomy in learners in contrast to a teacher-centric model where they remain dependent on, and subject to an individual teacher's preferred approach
Satisfaction	Feedback allows students to monitor their own progress, and to gain satisfaction from measuring their progress towards higher goals
Social dimension	With the current generation of online systems, learners may also be able to see how their performance compares with that of their peers, to connect with tutors or peers to discuss study-related matters, or engage in peer reviews to evaluate their own understanding against other students' performance

5.5 Motivation and Peer Interaction

PeerWise is an online system designed to allow students to author, rate, and analyze multichoice questions (http://peerwise.cs.auckland.ac.nz/). In a typical assessment task, students write original questions, as well as answer, rate for difficulty and quality, and comment on questions authored by their peers. This form of "flipped assessment" truly acts as a catalyst for learning in the way that Draper (2009) describes. Writing good questions demands attention to course content and engagement with concepts. Rather than picking answers from a list of options in a task that could rely on surface learning, students generate questions and engage with possible answers in ways that promote deep processing. PeerWise also introduces an element of healthy competition to learning, as students earn badges for contributions and aim for high scores on quality ratings. Table 5.1 and Table 5.2 illustrate the alignment of typical tasks with elements of motivation.

The collaborative and catalytic affordances of the current generation of online peer assessment tools are an emergent phenomenon. The implications for learning are considerable, as researchers are in the process of discovering (e.g. Devon et al. 2012). The large volume of research outputs generated by the PeerWise user community contributes to a growing knowledge base for peer and online assessment. Points of particular note include the opportunity to apply what Collis and Moonen (2006) and Hamer et al. (2008) described as "contributing student pedagogy" and the use of highly visible and multidirectional patterns of peer interaction rather than "invisible" connections that are solely between learners and teachers.

Table 5.2 Motivational elements of a peer assessment task

Motivational aspect	How addressed
Attention	Attention is focused on the task of authoring or discussing the quality dimension of peer-generated questions. Pointers to study materials and course-related activities and resources guide learners to the various sources of learning on a particular topic as a precursor to writing a question or committing to an opinion on its quality and level of difficulty
Relevance	Determining the relevance of elements of content for authored or reviewed questions requires learners to make a number of critical decisions. The deep processing promoted by this kind of assessment task typically focuses on internal relevance, i.e., of components of a topic or task. External relevance, i.e., of the topic in the wider context of a course, is often addressed through other means, although this is not exclusively the case, as questions can address any aspect of a topic
Confidence	Feedback from teachers or peers allows learners to assess their own level of performance against highly rated answers or that of their peers, and to build confidence through that understanding. Furthermore, comments on questions and quality and difficulty ratings expose learners to multiple perspectives and reasoning that may contribute to their own learning. One does not have to be a high performer to learn from others in this way, and the visibility of thinking and knowledge at all levels of performance provides a sense of confidence of place

Table 5.2 (continued)

Motivational aspect	How addressed
Satisfaction	Satisfaction comes from knowing how others rate a learner's contribution, and the ability to choose to strive for higher performance with knowledge of what is involved in reaching that target. For high-performing students, satisfaction comes from knowing their level of achievement is endorsed by their peers. For others, it comes from having a clear target to aim for, and knowing that the means of achievement are available on demand
Social dimension	The social dimensions of motivation related to a system like PeerWise are complex, and designed to be supportive for learners at all levels of performance. The visible nature of reasoning and the responsibility to openly commit to an opinion on a learning task are relatively novel dimensions that reflect the rise of social networking among the current generation of learners. The open, collaborative nature of a system like PeerWise has multiple effects, which are still being explored

5.6 Feedback and Learner Motivation

Online marking assistants, such as GradeMark and Lightwork, are increasingly popular tools that show high-efficiency gains in handling of assignments, particularly for large classes. Many benefits of these tools are practical ones, e.g., easy handling with no paper scripts to be mislaid, fast turnaround, high legibility of comments, rubrics to define what a good assignment looks like and ensure consistency across markers, and less repetitive work for markers as common feedback elements can be stored and reused. The faster turnaround time for marked assignments is also having a positive impact on learner motivation, as more students check their marks and read feedback online than was the case with hard copies. One report (Fearn 2011) states that 90 % of students had accessed assignments to read feedback 3 days after marked work was returned, where in previous years, fewer than 25 % of scripts were ever picked up. Besides causing frustration for teachers who put so much time and effort into marking, the perceived usefulness of the opportunity to learn from feedback was also unreasonably low. Anecdotal evidence suggests that this is a common situation that online marking assistants are also helping to address in other contexts.

Regardless of the grade achieved for an assignment, all dimensions of motivation are addressed through this changed student behavior around online feedback as the following summary illustrates (Table 5.3).

The ways that the dimensions of motivation are addressed through constructive feedback are neither complex nor new knowledge. What is new is the ability of online marking assistants to facilitate the delivery of feedback in a timely manner. This makes it useful to students in ways that were previously not possible, particularly in contexts where class sizes have increased and resources for teaching diminished. The key factors are timing, ease of access, and legibility of feedback. Further research is required to explore more nuanced aspects of the impact and affordances of this type of technology, but the early signs are positive.

Table 5.3 Motivational elements of feedback

Motivational aspect	How addressed
Attention	Constructive feedback focuses learner attention on areas of good performance and on those where improvement is needed. Depending on how feedback is constructed, attention may be drawn back to particular topics, materials or concepts, or model answers. This helps to set realistic expectations, and timing is a critical factor if feedback is to be useful
Relevance	The relevance of work on assignments is obvious to learners as long as tasks are well aligned with learning objectives and content. Feedback reflects how well learners have performed against course objectives. Targeting feedback to particular aspects of student work can reinforce the points of relevance, and highlight key areas of knowledge or demonstrated ability
Confidence	Feedback builds confidence by allowing learners to know their level of knowledge and ability, and how this compares with peers. It also helps them to know what they don't know, and how to address future learning goals
Satisfaction	The ability to monitor and see progress in learning provides satisfaction. Feedback supports this ability on many levels
Social dimension	The social dimensions of motivation related to feedback vary according to type and delivery method. If peer feedback is a feature, then the ability to see things from other learners' perspectives can be a productive force. Discussion of feedback with peers and teachers facilitates deeper learning through reflection and follow-up action. This can take place in formal or informal settings

5.7 Principles for Online Assessment Design

The three examples outlined above reinforce the need to focus on core elements of motivation in learning design, and to use the affordances of technology as activators.

Experienced learning designers may take such requirements for granted. These are, however, features that were often overlooked as university classes became larger and more diverse throughout the last decades of the twentieth century. The growth of online learning was a further complicating factor, as learners in the transition phase between lecture based and blended learning became increasingly bored and isolated by learning design traditions intended for a different mode of study. Much has been written about the characteristics of the "net generation" of twenty-first century learners (Oblinger and Oblinger 2005; Kennedy et al. 2007). There is still some debate about the digital literacy capabilities of students in higher education. However, there can be no doubt that they are more advanced in this respect than the previous generation was, because of the increase in mobile and smart device ownership, and the growth of social media and networking online. The "digital native" student described by Prensky (2001) may not yet be ubiquitous, but numbers and capabilities are clearly on the rise. Teachers still struggle to separate hype from real potential, and to develop capacity to turn the potential of emergent social and technological trends into positive influences on motivation and learning. As always with new technologies and changing sets of circumstances, no one can really predict

where these trends will lead. Further research is needed to guide future developments in useful directions.

What is also clear at this point is the need to flip learning design as well as the classroom, as teachers of large diverse and sometimes remote classes cannot always know as much about their learners as they would like to. With little opportunity to address individual differences on a personal level, this can still be achieved at the level of course and assessment design. Principles of good practice include offering flexibility to capture attention and interest; choice to foster autonomy and learner control; timely constructive feedback to keep expectations on track and build confidence along with knowledge; and opportunities for social interaction to promote a sense of achievement and place within a learning community. If there is one overarching principle of assessment design to motivate the twenty-first century learners, it would have to be "stick to the basics" for learning theory and method. However, for the current generation of learners, the affordances of online assessment tools are far from basic. While design principles may be basic, the designs themselves are highly sophisticated and evidence based.

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