

01 **Chapter 13**  
 02 **Epilogue: Achieving Quality 21st Century**  
 03 **Assessment**

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 07 **Betsy Jane Becker and Valerie J. Shute**  
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 13 Writing a chapter to summarize all of the contents of this multifaceted book presents  
 14 a challenge. Rather than create a laundry list of the conclusions drawn by our  
 15 authors, we have tried to draw out three themes that appear across the works herein.  
 16 These themes represent ideas that we believe will need careful attention from assess-  
 17 ment experts, measurement professionals, teachers, principals, learning scientists  
 18 and many others if the field is to move forward to develop better assessments  
 19 that promote learning as well as provide fair means of accountability for students,  
 20 teachers, and schools. We argue that

- 21  
 22 ● Assessment must capitalize on advances in technology,  
 23 ● Assessment is a contextualized, social activity, and  
 24 ● Assessment must serve teaching and learning.

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 26 We discuss in turn how each of these themes is raised by the authors of our book,  
 27 and also touch on potential areas for research suggested by their work. We do not,  
 28 however, mention every instance in which every author touches on these themes.  
 29 We apologize if we have omitted points on these themes that are important to our  
 30 authors.  
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 33 **13.1 Assessment Must Capitalize on Technology**  
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 36 Technological advances have already clearly affected the world of assessment in  
 37 many ways. Even mundane components of assessment, such as the scoring of mul-  
 38 tiple choice questions, were long ago made easier by Scantron machines and other  
 39 scanning devices (Clarke, Madaus, Horn, & Ramos, 2000). However, while such  
 40 devices enabled the rapid increase and widespread use of testing in the schools in the  
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46 1960s and 1970s, they did not always lead to improvements in what we know about  
47 students, or in what students learn (e.g., Epstein, Epstein, & Brosvic, 2001). Indeed,  
48 while modern technologies clearly have made an impact on how testing is done, it  
49 is clear they present both new challenges and new possibilities for assessment in the  
50 twenty-first century (e.g., Naglieri et al., 2004).

51 Hickey, Honeyford, Clinton and McWilliams examine a context where technol-  
52 ogy is inherently part of the assessment—the assessment of competence with new  
53 media. New media literacies include activities as diverse as social networking, cre-  
54 ation of fan fiction, music remixing, and blogging. Because nearly all new media are  
55 based in technology, to assess competencies in these domains requires that technol-  
56 ogy be embedded in the assessment process. However, it is also true that traditional  
57 literacy skills—in writing, reading and spoken communication—are both needed for  
58 and enhanced by use of new media (see also Leu, O’Byrne, Zawilinski, McVerry, &  
59 Everett-Cacopardo, 2009). While endorsing the idea of assessing new media com-  
60 petencies, Hickey and his colleagues raise considerable concerns about whether the  
61 advent of accountability in this domain will narrow views of “proficiencies” to what  
62 is easily measured. Indeed, since many new media skills are inherently social (see  
63 our next theme), but most existing assessment systems are fundamentally individ-  
64 ualized, clear tensions and conflicts will play out as assessment of these new skills  
65 moves forward. Given the view of many scholars that media literacy is (and must  
66 be) entwined with a participatory culture, such tensions will be a key concern for  
67 the field. But as with many challenges, also see interesting possibilities for research.  
68 For example, how should we best assess media literacy? Is it ever possible to gauge  
69 individual contributions to fully participatory activities? Many interesting research  
70 questions will emerge in relation to this context.

71 Several authors in our volume attend to the role technology must play in the  
72 future of assessment. An argument for an elegant system of evidence centered  
73 design (ECD) for assessment is given by Russell Almond. Almond lays out key  
74 aspects of the ECD philosophy he has developed with collaborators Robert Mislevy  
75 and Linda Steinberg. His chapter makes concrete how a complex mathematical  
76 modeling framework can be combined with thoughtful consideration of the skills  
77 desired of an examinee population to produce both improved learning and qual-  
78 ity assessment all in one comprehensive system. The system relies on technology  
79 in its fundamental use of a Bayesian framework for evaluating student capacities.  
80 Information based on prior knowledge of examinee capabilities, along with data  
81 from observable events associated with a collection of tasks is fed back into a  
82 system to create posterior distributions of (hopefully changed) student skill lev-  
83 els. Almond also points out that an ECD system could aim at tracking growth in  
84 multiple competencies, based on related process or product observables, and can  
85 even interface with automated scoring systems (like those described by Shermis  
86 for essay scoring). Almond argues that eventually ECD, combined with modern  
87 technologies could support “seamless” (text page 30) collection of observables  
88 embedded in ongoing work—assessment that would seem so natural students would  
89 not realize that it had even occurred (see also Shute, in press for more on this  
90 topic).

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91 Clearly such assessment would not cause the stress and disruptions present in so  
92 much high-stakes testing (e.g., Cizek & Burg, 2005; Suen & Yu, 2006).

93 While they endorse many of Almond's ideas, commenters Ellington and Verges  
94 point out that currently schools do not have the infrastructure to support these inno-  
95 vations. For example, problems and incompatibilities in hardware and software  
96 could lead to glitches with data collection from diverse sources. Also while they  
97 acknowledge the benefits of using complex tasks in assessments, they raise several  
98 practical problems (such as cost and extensive field test requirements) that would  
99 limit implementation especially in the current economic climate. Clearly such a  
100 system for assessment does not currently exist, but the goal of realizing it presents  
101 another set of fascinating possibilities for research.

102 A more conventional take on technology and assessment comes from Mark  
103 Shermis. His chapter describes how technology can assist with improved student  
104 learning of writing skills when the electronic scoring of essays is built into a system  
105 of writing improvement, along with revision, feedback, and teacher participation.  
106 Shermis describes how automated essay scoring or AES works, from the develop-  
107 ment of "proxes" or features used to represent the quality of a writing sample, to  
108 the evaluation of the statistical models used in algorithmic scoring. Shermis cites  
109 evidence that with careful development and good rubrics, an AES system is at least  
110 as reliable as human raters, and can in some cases help avoid biases that human  
111 raters cannot seem to eliminate from their rating behavior. One goal of this chapter  
112 is to simply describe how AES works, and Shermis further illustrates that by way of  
113 a detailed description of the "Intellimetric" system. However Shermis goes farther,  
114 and makes the controversial claim that automated essay scoring (and the teaching  
115 structures associated with its ongoing use) can replace high-stakes writing assess-  
116 ments. Consistent with Almond's arguments for incorporating multiple pieces of  
117 evidence in on going assessment system, Shermis argues that an assessment based  
118 on multiple instances of writing (such as essays produced throughout the year)  
119 would provide a more useful and valid evaluation of student writing than a single-  
120 occasion high stakes test. He describes how an integrated writing assessment system  
121 could also support instruction by providing feedback aimed at each essay produced  
122 by a student. In addition, the release of "used" writing prompts could provide mate-  
123 rials for ongoing instruction. Finally he argues that all of this can be accomplished  
124 at costs lower than those incurred with human scoring of similar writing products.  
125 This is an excellent example of how capitalizing on technology can enhance not  
126 only the assessment itself but also student learning. And as with our other chap-  
127 ters that touch on technology, various ideas for research arise from Shermis's work.  
128 For example, what measurement models best suit this kind of assessment system?  
129 How often would one need to take samples of writing throughout the year to get  
130 solid information about change in writing competence? Could an AES system have  
131 a built-in way to assess the impact of particular kinds or amounts of teacher (or sys-  
132 tem) feedback? How would we assess whether the system is providing appropriate  
133 feedback to students (i.e., what kinds of "quality control" would be needed)? These  
134 and other practical and theoretical questions provide a rich set of ideas for those  
135 interested in the future of assessment.

## 13.2 Assessment is a Contextualized, Social Activity

The strongest advocate of the social view of assessment in our collection of authors is James Gee. Gee lays out the case for assessment of twenty-first century skills in domains as part of social “appreciative systems”. Loosely these are sets of conventions, values—perhaps even rules—for what is acceptable or valuable in a certain domain. He argues that appreciative systems are shared across people, and gives quite a few examples of how such systems develop. He also argues that most assessment goes on as a part of ongoing human interactions and activity, and is not—and does not need to be—formalized. King Beach, who comments on Gee’s chapter, provides several examples of such real-life assessment in out of school settings in western Nepal.

Gee also contends that groups themselves can formalize assessment in a quite natural way. He argues that this often occurs via “Pro-Am” communities, or groups of “... innovative, committed and networked amateurs working to professional standards” (Leadbeater & Miller, 2004, p. 9). A compelling example comes from his research on online communities (Gee & Hayes, in press) where a young girl learned to create virtual clothing for the virtual world *Second Life*. Eventually various discoveries lead her to provide clothes to virtual people on the Internet, first for free then later at a price, after she realized that the “appreciative” community of virtual shoppers highly valued her product. More controversially, Gee goes on to argue that schools could promote twenty-first century skills by encouraging and equipping students to become high-status members of Pro-Am communities that value and promote such skills.

Gee notes that society has in some cases formalized assessment by removing it from such Pro-Am communities. Institutions, including schools, have been created in support of this formalization. But Gee believes this kind of assessment is “backwards” (text page 28) because it occurs at such an abstract, disembedded level, removed from real problems. His arguments for authentic assessments echo in part those of measurement scholars (e.g., Wiggins, 1990) and others (e.g., Darling-Hammond & Snyder, 2000) who called for more realism and context in assessment years ago.

Finally, Gee raises the radical idea that formalized assessments may not be needed if existing communities (like the online buyers of simulated clothing) have already assessed and accepted someone’s skills. He states that, “The job of educators ought to be designing such social organizations and letting them run.” (text page 32) Again we see plenty of possible research avenues in this work, and Beach’s commentary raises one interesting question—what is the appropriate unit of assessment in such circumstances? Could we find a way to examine the developmental relationship between a learner and the domain to be assessed, over time? Could such a complex entity be assessed by the “indigenous workings” (Gee page 32) of the group, as advocated by Gee? It is intriguing to consider how one could study and obtain empirical evidence on such a system of assessment.

Hickey and colleagues also deal with the social context for learning, which is fundamentally a part of examining competencies with “new media”. They begin by

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181 examining the positions of groups like the National Council of Teachers of English  
182 and the National Writing Project, which argue that writing is an inherently social  
183 activity. This is a launching point for the efforts of Hickey and his colleagues to  
184 create a cohesively designed assessment framework for language arts. Their efforts  
185 have used not only a classic text (*Moby Dick*) but also new media sources such as  
186 related music videos and theatre “re-mixes”. They argue that by using multiple lev-  
187 els of assessment (designed after Ruiz-Primo et al. 2002 five levels) the teacher can  
188 focus initially and closely on social and interactive aspects of writing, with a quick  
189 time frame for feedback and a very informal assessment context. The assessments  
190 and classroom activities then move to more individualized, but distant aspects at  
191 other levels. Their chapter gives many examples of assessment activities at their five  
192 levels, but the contextualized nature of assessment is most evident at their first two  
193 levels. Only at the highest level would fully individualized assessments (e.g., exter-  
194 nal tests with essay items) be used to tap into an abstract context, and might, for  
195 instance, measure performance on content standards such as those at a state level.

196 We consider one example from their second level—“close-level activity-oriented  
197 reflections” (page 29 of text). Here the focus is on discussion questions presented  
198 to the class, either orally, in written form, or online. The authors found that the  
199 informal nature of these assessments and an attendant emphasis on “communal dis-  
200 cussion” of ongoing classroom activities enhanced broader student participation.  
201 The teacher then could consider the nature of the discussion, and focus further  
202 discussion in ways that led students “. . . to create more compelling and creative arti-  
203 facts” (page 30 of text). This is an interesting example of how a teacher can assess  
204 student understanding in a group context, provide feedback based on questions that  
205 are less formal, but very targeted to the activities of the learners.

206 Allan Jeong’s work in examining conceptual causal maps provides a nice exam-  
207 ple of how learning can be enhanced by the use of social interactions and by  
208 assessments that provide a window on the understandings of experts and of other  
209 learners. Jeong describes the use of jMAP, a program that enables learners to create  
210 and evaluate causal maps, and also allows for the assessment of changes in maps  
211 over time. Students use jMAP to identify critical components of a causal system,  
212 to draw interconnections among those components, and to identify the strength of  
213 those connections. The connection to “others” is embedded in the structure and use  
214 of jMAP. Specifically, after creating their own maps, students can be exposed to the  
215 maps of experts, to discussions about the nature of the causal connections (as was  
216 the case in Jeong’s studies), and to composite maps made by aggregating the maps  
217 of various subsets of learners or all learners in a class. Subsequent rounds of maps  
218 can be drawn and changes in the maps of learners can be examined. Jeong shows  
219 how comparisons of individual versus aggregate maps can lead to changes in subse-  
220 quent maps of individual learners. Also the nature of discussions held (e.g., whether  
221 links in the maps are supported or challenged by others, whether explanations are  
222 provided, etc.) can impact how learners change their maps on subsequent drawings.

223 For those interested in how learner interactions can impact learning, jMAP pro-  
224 vides intriguing tools for analysis of causal maps. We challenge those interested in  
225 such phenomena to consider how learning in other domains of understanding (i.e.,

226 other than causal maps) might be represented (using technology) and then exam-  
227 ined for changes due to exposure to the knowledge and ideas of others. Domains  
228 suggested by the work of our other authors might include writing, where automated  
229 scoring systems like those described by Shermis could produce indices of change  
230 following peer or teacher feedback of different sorts, or Gee's "Pro-Am skills"  
231 where changes in the products or skill sets of members of Pro-Am communities  
232 might be evaluated for evolution as individuals receive feedback from relevant com-  
233 munity members. Roehrig and Christesen's Classroom AIMS is another assessment  
234 device where modal (typical) or expert performance ratings could be shared with  
235 teachers, and then further measurement instances could be evaluated for change due  
236 to those different kinds of feedback.

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### 240 **13.3 Assessment Must Serve Teaching and Learning**

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242 Mari Pearlman views assessment as integral to the educational enterprise. In her  
243 chapter she argues that we must "...ally assessment with instruction" (page 20 of  
244 text version) and she makes a provocative case for using an assessment based on  
245 the vast architecture of the National Assessment of Educational Progress or NAEP  
246 as a vehicle to accomplish this goal. Pearlman outlines a variety of problems in our  
247 educational system, and among them she lists a need to align all components of  
248 the system—curriculum, teacher practice, teacher preparation and assessments—in  
249 concert to move student learning ahead. She argues that to date these components  
250 have been manipulated by the states, but mainly in efforts to achieve "AYP" or  
251 adequate yearly progress, not in efforts to increase learning of content identified  
252 as important (See for example Kane, Staiger, & Geppert's, 2002 views on gam-  
253 ing the AYP system so states can look most successful). Pearlman endorses the  
254 move towards national standards, and argues that having clear frameworks could  
255 lead to national "conversations" about content, curriculum and most importantly  
256 equity across states. Equity is an issue conveniently (but sadly) avoided in the cur-  
257 rent context, where each state can use its own distinct tests to assess progress, and  
258 also can set different goals. In such a context, it is not hard to see that all states  
259 could theoretically measure up as "adequate" while in fact being quite different in  
260 terms of what their students actually learn. Initial examinations however showed that  
261 some states did the opposite—setting such high standards that they were virtually  
262 unreachable (Linn, Baker, & Betebenner, 2002).

263 In terms of the theme of assessment in support of learning, Pearlman chal-  
264 lenges us to find ways to use the many items developed as part of the  
265 NAEP assessments in support of learning. Indeed, thousands of released NAEP  
266 items are currently available for public use via the NAEP Questions Tool  
267 (see <http://nces.ed.gov/nationsreportcard/itmrlsx/landing.aspx>), and can be used by  
268 teachers and others in a variety of ways. Much like the position taken by Almond,  
269 Pearlman argues that we must first know what we want students to learn, then what  
270 we want to measure, then only last can we design lessons and activities to support

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271 those goals. Pearlman argues that if benchmarks such as those set for NAEP were  
272 used as goals, and NAEP's current plan of sampling students were replaced with  
273 every-pupil-testing, we would soon move towards better outcomes and towards  
274 equity across states in terms of student learning.

275 In her response to Pearlman, Lynn Wicker emphasizes a point made by Pearlman.  
276 That is, both agree that the culture of schools relative to assessment must change  
277 so that a stronger link to learning can be achieved. Wicker argues that the use of  
278 multiple ongoing assessments tied with targeted interventions "should be viewed as  
279 a non-negotiable in the learning process" (page 6 of text version). We also strongly  
280 endorse this view.

281 Martineau and Dean give perhaps the most comprehensive proposal in our vol-  
282 ume for how assessment, in many forms and at many levels, can serve instruction  
283 and learning. They draw on the idea of balanced assessment (Redfield, Roeber,  
284 Stiggins, & Philip, 2008) and elaborate it to describe how formative, summative and  
285 interim assessments can be used to provide both indices for accountability as well  
286 as detailed input to teachers in support of their instruction. Their system begins with  
287 clear and focused K-12 content standards, aimed at supporting students' progres-  
288 sion towards specified high-school outcomes. They argue that curriculum materials  
289 ("model curriculum units") can then be developed in support of these standards, and  
290 be made available to all teachers (but not mandated as a required curriculum). This  
291 set of content standards and materials would be paired with professional develop-  
292 ment for teachers aimed at helping them to understand the content standards and  
293 how they can be used, but more critically how to use data from assessments—both  
294 classroom assessments and more formalized "secure" assessments to modify their  
295 instruction.

296 A requirement that teachers receive instruction in classroom assessment is  
297 already a part of the Florida Department of Education's preservice teaching require-  
298 ments. Martineau and Dean want continued support in the form of professional  
299 development for both teachers and other administrators. They also argue that  
300 accountability purposes can also be served by their system, but only with a mul-  
301 tifaceted system in which teachers, teacher preparation institutions, administrators  
302 and students are all held to account.

303 Working from a very different perspective, Hickey and colleagues also describe a  
304 system of assessment that focuses on different kinds and levels of assessment in the  
305 context of new media literacy. Based in the technological context discussed earlier,  
306 the first three of their five levels of assessment—the immediate, close and proximal  
307 levels—are completely entwined with student products (artifacts) and interactions  
308 with teachers and other students as they create those products in the classroom. At  
309 the third (proximal) level the assessment tasks move towards more individualiza-  
310 tion, but even at this level reflection questions and student products together allow  
311 for targeted teacher feedback. Their system illustrates how assessment can be tied  
312 directly into ongoing instruction.

313 A more targeted approach to both assessing and supporting instruction is  
314 described by Roehrig and Christesen. They describe the development and use  
315 of the Classroom AIMS instrument, which examines how teachers create a

316 positive classroom atmosphere, implement instruction and classroom management,  
317 and engage students in learning. Roehrig and Christesen start with the premise that  
318 teachers' behaviors and activities are more likely to predict student outcomes than  
319 teacher characteristics such as teacher knowledge. They describe how a set of exem-  
320 plary behaviors were identified by observing teachers who had produced students  
321 with strong learning gains in reading and writing performance. More importantly for  
322 this "theme" of our book, the authors go on to describe how the AIMS instrument  
323 can be used not just to observe the current behaviors of teachers, but also to diagnose  
324 possible areas for teachers to improve. They describe the use of the AIMS with pre-  
325 service teachers as well as practicing teachers working with mentors. Other research  
326 questions could be asked about the Classroom AIMS. How does AIMS function as  
327 a measure of the effects of professional development for practicing teachers? Can it  
328 differentiate between more and less effective interventions? How well does it work  
329 across different subject areas? These and other questions may be fertile areas for  
330 future research.

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### 333 13.4 Conclusion

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335 As mentioned in the Prelude, our goal for the symposium and this book was to  
336 bring together groups of individuals who normally do not converse, but who we  
337 believe should communicate—researchers from different areas, policymakers, and  
338 educational professionals. In all chapters, the call for educational reform is clear and  
339 there is no shortage of problems to be addressed with innovative thinking and high-  
340 quality research. The linchpin for such reform—reform that aims to fully support  
341 students' success in the twenty-first Century—is assessment.

342 The chapters in this book present a broad swath of assessment issues and pos-  
343 sible solutions, and embrace three main theses: (a) assessment must capitalize on  
344 advances in technology, (b) assessment is a contextualized, social activity, and (c)  
345 assessment must serve teaching and learning. Each of these alone can move the  
346 assessment conversation and ensuing research forward, but we contend that when  
347 these issues are considered collectively, important breakthroughs in assessment and  
348 educational reform will surely follow.

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406 **Chapter 13**

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