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AUTHOR & ACADEMIC EXCHANGE QUARTERLY

Interdisciplinary Assessment in the 21st Century

Susan M. Drake, Brock University, Canada
Joanne L. Reid, Brock University, Canada

Drake Ph.D. is a Professor of Education specializing in curriculum and assessment and Reid is a doctoral student interested in assessment and interdisciplinary curriculum.

Abstract

What's important to know, do and be and how to teach and assess this is being redefined. Integrated curriculum can address this call for new pedagogy, but interdisciplinary assessment remains a challenge. This study focuses on the assessment practices of 19 educators who implemented integrated curriculum in an Ontario, Canada school district. These educators experienced greater efficiency in classroom assessment and acquired deeper assessment literacy. However, they faced particular assessment challenges. This study contributes to the global conversation on next steps to address integrated assessment.

Introduction

Significant trends have emerged in the 21st century for curriculum, teaching and learning. Currently what is worth knowing, doing and being is being redefined in a global conversation. Value has shifted from the regurgitation of memorized content to the application of interdisciplinary skills (sometimes called 21st century competencies) such as communication, inquiry and problem-solving, critical and creative thinking, and citizenship. Organizations such as OECD (Organization for Economic Cooperation and Development), ATC21S (Assessment and Teaching of 21st Century Skills), Partnership for 21st Century Skills (P21), Canada 21 and ISTE (International Society for Technological Education) are influential participants in the global conversation that advocates for deep learning as an important goal of 21st century pedagogy. Deep learning is focused on student-centred, concept-based and skill-enhancing curriculum, student-teacher learning partnerships, effective use of technology and diverse instructional and assessment strategies to meet individual student characteristics (Australian Curriculum, Assessment and Reporting Authority, 2013; Brooks & Holmes, 2014; Finnish National Board of Education, 2015; Fullan, 2013; Fullan & Langworthy, 2014; Hargreaves & Shirley, 2009; Hattie, 2012; Ontario Ministry of Education, 2015; Scottish Qualifications Authority (SQA), 2003; Singapore Ministry of Education, 2010; United Kingdom, Secretary of State for Education and Skills, 2003, July).

Interdisciplinary learning aligns well with 21st century pedagogy and is being implemented in jurisdictions around the world (Savage & Drake, 2016; Drake & Savage, 2016). (The terms integrated and interdisciplinary will be used interchangeably for this paper.) First, student-driven project-based learning, which is readily integrated or interdisciplinary in nature, aligns with the new pedagogy, often through cross-curricular rich performance assessment tasks (Boix-Mansilla & Gardner, 2005; Buck Institute for Education, 2016; Drake, Reid, & Kolohon, 2014).

Second, interdisciplinary learning fosters the shift from the acquisition of facts to learning around concepts (big ideas) and enduring understandings (Erickson, 2008; Ontario Ministry of Education, 2015). Third, the big ideas and complex problems of an interdisciplinary approach provide a rich and relevant context for the explicit instruction and application of disciplinary and interdisciplinary concepts and skills (Rotherham & Willingham, 2009). Research shows that students in interdisciplinary programs do as well academically, or better than, students in traditional programs (Aikin, 1942; Drake, 2007; Drake, Savage, Reid, Bernard, & Beres, 2016; Reeves, 2009). As well, interdisciplinary curriculum tends to increase student engagement (Russell & Burton, 2000; Carmichael, 2015).

Despite its benefits, a challenge of interdisciplinary work is assessment. Research on integrated curriculum from the late 1980s and early 1990s emphasized curriculum planning (for example, Beane, 1991; Erickson, 1998; Jacobs, 1989), but assessment was given less prominence. Today, assessment must be addressed more explicitly because the 21st century is also an age of accountability. Since the standards-based reforms took hold in the mid-1990s, some literature has addressed interdisciplinary assessment (Brough & Pool, 2005; Drake, 2007; Drake, Reid, & Kolohon, 2014; Erickson, 2008; Griffin, McGaw, & Care 2012; Moss, Osborn, & Kaufman, 2008; Kellerher, 2008; Rotherham & Willingham, 2009). Two recent books are *Assessing 21st Century Skills* (Greenstein, 2012) and *Project-based learning across the disciplines* (Warren, 2016).

The purpose of this paper is to reflect on a study of teachers and administrators when they implemented interdisciplinary curriculum just as provincial discussion of 21st century education reform was heating up. Our emphasis here is on interdisciplinary assessment. Since the original study, the assessment context in Ontario and globally has changed significantly, which warrants such reflection. The educators' experiences may contribute to the emerging understandings of 21st century pedagogy and assessment.

Context

This study took place in a largely rural district in Ontario in 2009. Interdisciplinary approaches were encouraged in Ontario's curriculum documents, but not widely implemented across the province. This school board initiated an integrated curriculum approach across all its elementary schools. Our study participants included 10 teachers and 9 administrators from 16 different schools. The teachers had implemented an interdisciplinary curriculum for one to two years.

Method

This study was a generic qualitative study. A team of four doctoral students and one university professor conducted telephone interviews with the 19 participants. Interview questions focused first on stories of best experiences and what educators valued about integrated curriculum, followed by targeted questions on numeracy, literacy, higher-order thinking and assessment. These topics were priorities of Ontario's Ministry of Education, and thus, the school board at that time. Notes were made of the interviews. Transcripts were constructed from these notes and were returned to participants for their approval. Participants were asked to make necessary changes to ensure accuracy.

The work of Rubin and Rubin (1995), Creswell (2008), and Reed (2007) guided data collection and analysis. All transcripts were read for a general sense. In a second reading, categories were created. All five researchers cross-referenced each other's transcripts to establish emerging themes. A further analysis led to emerging subthemes. A qualitative narrative was written to serve as a Final Report. Validity of the research was determined by adopting several strategies such as triangulation of the data, member check of the transcripts, clarification of the researchers' biases, and the inclusion of discrepant information (Anderson & Arsenault, 2000; Creswell, 2008; Fraenkel & Wallen, 2005).

Results

The perceptions of educators about their first- and second-year experiences with an integrated program indicated positive results in several areas. In general, participants reported that student engagement with an integrated curriculum was much greater compared to engagement during a more traditional subject-based approach. At-risk students and gifted students responded well to this approach.

Undertaking an integrated approach encouraged professional growth among teachers. Teachers especially enjoyed the collegial collaboration of curriculum planning. Some teachers shared instructional activities. These collaborations were described as enriching. Teachers stated that the integrated units fostered higher order questioning and greater differentiation of instruction and assessment. There was an increase in formative assessment. Expectations for student performance rose. In summary, many of the Ministry goals were addressed through an integrated approach.

This article focuses particularly on assessment. Four interconnected themes emerged in the area of assessment practices: increased depth and diversity of assessment tasks, increased efficiency, deeper assessment literacy among students and teachers, and the challenge of reporting. Each theme is explored below.

Increased depth and diversity in classroom assessment

The teachers used a backward design curriculum planning model to establish validity (Drake, 2007; Wiggins & McTighe, 2005). Working collaboratively and individually, teachers developed their own units. They started by identifying big ideas, enduring understandings (the KNOW) and interdisciplinary skills (the DO) based on the required standards in selected subject areas. Next, the teachers created a rich summative assessment task. Finally, they created daily instructional activities that included embedded assessment. All activities were aligned and enabled students to perform the culminating task. Thus, all instructional activities and assessments had a purpose.

The rich culminating assessment tasks gave students opportunities to demonstrate the knowledge and skills they had acquired across several subjects. For example, three teaching partners of Grades 7 and 8 created an environment unit around the enduring understanding “I have the power to impact the world”. The summative assessment task was the creation and presentation of a public service announcement. Students used inquiry, reading, and writing skills to research an issue in science. They used technology and media literacy skills to create the multimedia presentation, and used oral language skills to present their product and describe their learning process.

Another example of a rich integrated summative task occurred in a Grades 7/ 8 unit based on the theme “We can make a difference, one choice at a time.” Together, the teachers and students looked at curriculum documents through the conceptual lenses of sustainability and social justice. Collaboratively, they created a cohesive unit. Their enduring understanding was “Daily decisions have worldwide impact”. The unit culminated with a Fair Trade Fair open to the school community. The students created displays and delivered presentations based on their research into the political, social, economic, and environmental implications related to the global trade of everyday products such as chocolate, coffee, and running shoes. Standards from Language Arts, media, geography and science documents were met.

The rich assessment tasks of these examples prompted positive reflections.

I see that [interdisciplinary] assessment tasks that students are engaged in are bigger, meatier, and allow for more demonstration of knowledge and skills. It's hard work. The summative task focuses on the big pieces of curriculum, the big ideas, the important expectations. (Teacher)

The work of designing and implementing rich assessment tasks seemed to be worth the effort.

Using backwards design and interdisciplinary planning leads to better support for students as they meet these high expectations—making connections, engaging students. If they are there and engaged, the quality of their thinking will go up naturally. (Administrator)

The culminating tasks tended to offer opportunities for flexibility and differentiation. Diverse students could meet high expectations.

I have been able to diversify my assessment tools and tasks to suit student needs. There is much more dialogue and more student-teacher conferencing going on. I really enjoy giving students choice to show what they know. Integrated curriculum adds flexibility to assessment practices. (Teacher)

One administrator commented that before integrated curriculum, students had trouble finding work that they were proud of. “Now, there is so much to be proud of; there are so many ways for kids to demonstrate their learning such as drama and technology.”

Increased efficiency in classroom assessment

Through rich assessment tasks, teachers were able to assess expectations in more than one subject at once. For example, participants recognized, taught and assessed literacy as a cross-curricular skill, not just pertinent to Language Arts. A few teachers continued to teach math separately, and some teachers integrated math only into data management activities. However, many teachers were able to integrate math into a real world context. Interdisciplinary curriculum offered efficiency in grading. Typically, a single culminating task provided marks for more than one subject area.

The most positive thing that I've come to realize is that less is sometimes more. You can cover a lot at the same time... You can mark two to three things and get the same information as you would from marking many things... You can cover and assess a combination of content and skills at the same time. (Teacher)

Deepening assessment literacy

The planning of integrated curriculum opened up opportunities for professional growth among the educators in this school board. The application of backward design encouraged participants to consider assessment alongside curriculum standards and instruction. One teacher found it challenging to be “working through rubrics and anchor charts, instructional rubrics, assessment rubrics...I hadn't heard those terms until this year. It's just that kind of thing - ideas are good but the language that goes with it is sometimes frustrating.” The initial frustration of new learning was countered by the positive belief that planning assessment for an integrated unit emphasized the coherence of curriculum, assessment and instruction, and enhanced teachers' assessment literacy. Their practices changed.

Teachers offered more choice, differentiated assessment tasks and built in more opportunities for student participation in planning. Teachers adopted more formative assessment strategies (Black, & Wiliam, 1998) and more opportunities for peer and self-assessment. One teacher said, “Before, I put my assessment at the end. Now, I do assessments throughout so I can help the students who need it and I give a variety of assessments.”

It's all about setting students up for success on the final culminating task. This is accomplished by ongoing assessment throughout the unit... I used diagnostic assessments such as asking students to provide definitions on an exit card or asking how the word could be used differently. (Teacher)

I am most pleased at the shift in teachers' attitudes from students feeling punished if they make a mistake to it's okay to make a mistake because they have an opportunity to relearn and do an upgrade. I think this is really authentic learning. It is just not regurgitation of facts and hoping you have studied what the teacher wanted. (Administrator)

Part of teachers' growth as assessors was a greater openness to involving others, both colleagues and students, in developing assessment tasks and criteria. One teacher of the Fair Trade Fair unit described a reason for the unit's success:

We actually found way too many expectations that connected to each other for one unit. I came up with the culminating activity and put together rubrics for it. The rest came from the kids. It was interesting to see them think this way. The unit was relevant to them because they created it. (Teacher)

Some teachers developed assessment tools or established criteria for success collaboratively with their students. "Students liked developing them [rubrics] and they do it in words that they understand. Before they just guessed what the expectations in a rubric meant." (Teacher)

I had never used student-generated rubrics before starting this project... Now my students participate in making them up ... for example, they just developed a writing task rubric. It seems to encourage them to buy into the task more. (Teacher)

Teachers were particularly enthusiastic about moderated marking – a process where they met regularly with other teachers to clarify assessment standards in light of student work.

I really liked the moderated marking. I liked working with other teachers to establish the criteria for a task and later to identify what a level three or four looked like in the particular assignment by looking at and discussing students' work. (Teacher)

Finding time to schedule moderated marking sessions was easier than before, since most teachers had been organized into collaborative planning groups.

Reporting as an Assessment Challenge

Along with benefits, teachers experienced challenges in assessing integrating curriculum. Resolving their assessment dilemmas further contributed to an increase in their assessment literacy. For some teachers, integration made for muddy reporting. As one administrator put it, "the lines are less clean... we are pulling literacy data from the history assignment... we are pulling math data from science." A teacher described this dilemma:

A problem with integrated curriculum is the report card. Where does it all fit? It is hard in the end. In the public service announcement project, we did language, media, an oral component and science. There are so many samples of reading, writing and oral skills. (Teacher)

Some teachers wondered whether they had sufficiently covered curriculum standards and whether they could provide accurate information about student achievement in specific subject areas. One administrator described how these concerns surfaced in his school:

Assessment is a stumbling block. It is one area where the Intermediate teachers are pushing back. They are struggling to report. For example, they are not comfortable that they have done enough for students to know about cells in science. (Administrator)

Gardner and Boix-Mansilla (1994), expressed a similar concern in their caution that disciplinary knowledge, concepts and skills not be lost in interdisciplinary programs.

Although collaborating with colleagues with complementary content knowledge and skills helped, some teachers disliked teaching with new technology or teaching outside their areas of expertise.

Conclusion

For the teachers and administrators in our study, the implementation of integrated curriculum influenced practice in ways that were aligned with Ontario reforms in curriculum design and assessment. We cannot say to what extent curriculum integration prompted these changes. Certainly, they cannot be attributed exclusively to the adoption of integration; we speculate that accountability mandates increased teacher awareness of

assessment generally. However, the collaborative process of planning integrated units encouraged teachers to clarify their understanding of standards and assessment. We learned, as did our participants, that many qualities of good assessment in a disciplinary program such as frequent and specific formative feedback and explicit evaluation criteria also apply to an integrated program.

We also observed that there are particular challenges related to assessment in an integrated program, especially around reporting in a credible way that meets accountability requirements. While the Ontario curriculum documents are subject-based, they use a spiraling concept-based approach through the grades. As well, each subject document advocates an integrated approach and all subjects use the same Achievement Chart for summative grading which focuses on understanding of foundational concepts and the interdisciplinary skills of communication and inquiry. Thus, Ontario educators can legitimately satisfy their curriculum standards by teaching and assessing concept and skill development rather than strictly subject-specific content. Professional development may be needed to help teachers adjust their thinking in this direction.

Additionally, since this study in 2009, Ontario's Ministry of Education released *Growing Success* (2010), a pan-disciplinary framework for assessment that emphasizes assessment for learning to balance assessment of learning. In 2016, the Ministry circulated a draft document for consultation that describes in detail the transdisciplinary 21st century competencies which seem to be the way forward globally to deep learning (Ontario Ministry of Education, 2015; Drake & Savage, 2016). Thus the lessons learned about interdisciplinary assessment by the pioneers in this board may be very valuable to other educators practicing in a more recent context.

As Ontario's reform agenda matures, we suspect that teachers and administrators have grown more comfortable with peer- and self- assessment, as well as other forms of formative assessment that would counteract traditional emphasis on summative subject-specific assessment. In addition, Ontario is undergoing a cultural shift towards the recognition of descriptive assessment feedback as a replacement for numeric grades. See for example, the Canadian Assessment for Learning Network's national blog entries and Twitter chats among educators who are experimenting with alternative ways to communicate assessment information (<http://caflnforum.ca>). While this process is slow, patchy, and almost exclusively applied for now to interim rather than final reporting, it has the potential to alleviate the stress around "muddy" grading.

Next steps could include how to reliably measure concept attainment and performance of the 21st century competencies. Additionally, the use of summative data – particularly from standardized tests – to inform interdisciplinary approaches needs to be explored.

This study offers only the beginning of an understanding of classroom assessment in an integrated program. In our final analysis, we find assessment in an interdisciplinary curriculum worthy of further study.

Endnote

This article updates and extends a previous paper by discussing how an interdisciplinary approach is increasingly important in the ongoing global conversation to define teaching learning and assessment in 21st century. Recent developments in assessment support the benefits of interdisciplinary curriculum as well as addressing the dilemmas it presents. ("Exploring assessment and integrated curriculum," *Academic Exchange Quarterly*, Spring 2010, <http://rapidintellect.com/AEQweb/redak1.htm>)

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