High Resolves
Creating Citizens & Leaders

Putting Learning Science at Everyone's Fingertips

Orange Paper #4

Putting Learning Science at Everyone's Fingertips

Advances in the field of learning science offer unprecedented opportunities for educators to capitalize on insights into human learning in order to improve student outcomes. The innovative Composer platform offers a unique technological solution that makes it easy for users to integrate these insights into content and curriculum design.

Summary

High Resolves has been leading a breakthrough collaboration effort among educational content providers.[1] The result of this collaboration is Composer—an innovative digital platform that empowers schools and organizations to search for the highest quality citizenship education curriculum from the world's best providers and string them together in powerful thematic sequences, in line with the latest insights from learning science.

The purpose of this paper is to outline the principles of learning science that underpin Composer's approach to content, curriculum design and delivery. The paper begins with a brief definition of learning science and its relevance to citizenship education and Composer through three primary areas of application: content, curriculum design, and delivery. The paper discusses each in turn, drawing on relevant literature for insights and providing examples to demonstrate how these insights are integrated into the design of the platform.

Learning Science

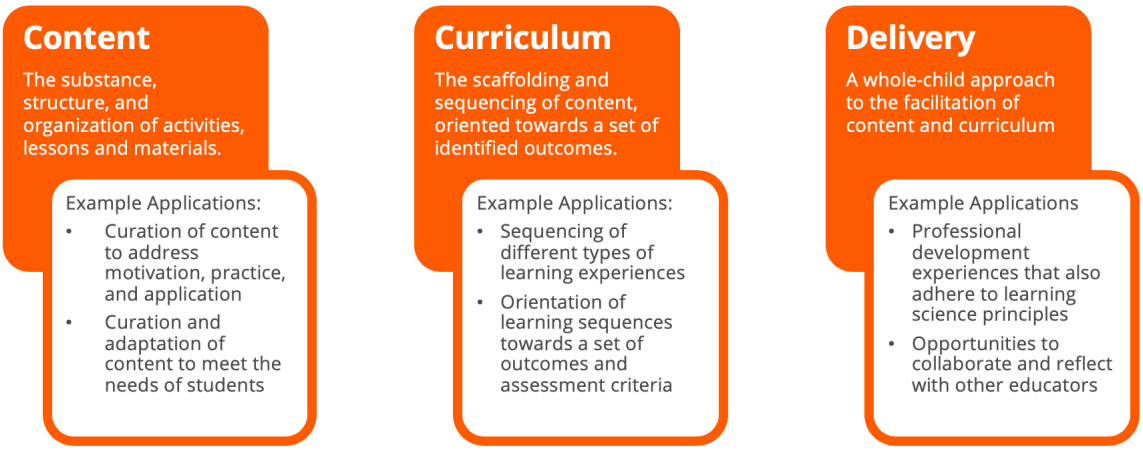
Learning science is a loose subset of cognitive science that addresses "motivation, goal-setting, memory, near- and longer-term learning, and learning media."[2] As an academic discipline, research in the field of learning science reveals key insights into how humans acquire, store, and integrate new knowledge skills and opportunities into daily life. These insights provide an evidence-base for educators to draw upon in their work, allowing for the design of education programming for students that capitalizes on ways we know the brain learns best.

"Learning science reveals key insights into how humans acquire, store, and integrate new knowledge skills and opportunities into daily life

[1] The collaboration consists of five original founding partners: Facing History, High Resolves, iCivics, Generation Citizen, and Peace First. The list of education service provider partners continues to grow over time.
[2] Hess & Saxberg, 2014 p. 35

One of the core functions of the Composer platform is to provide a curriculum-design interface that incorporates learning science applications as recommended by researchers and learning science engineers who translate the insights of learning science into practical strategies.

These applications can be categorized into three broad overlapping areas or types: content, curriculum design, and delivery.



Content

Content refers to the substance, structure, and organization of activities, lessons, and materials. At the content-level, insights from research in learning science can address a wide variety of applications, from the arrangement of visuals and media to the personalization and curation of content.[3] Composer's approach to content-type applications of learning science falls into two categories: 1) the back-end curation of different types of content to address motivation, practice, and application, and 2) the integration of resources to encourage users to curate and adapt content to meet the needs of students.

Types of Learning Experiences

Research has demonstrated how different types of learning experiences can motivate students and facilitate the transfer of new skills and competencies from working memory to long-term memory.[4] Drawing on this body of research, Composer categorizes these different learning experiences into three 'element' types:

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Peak Experiences are 'ah-ha!' moments where a student discovers that there are ways of seeing the world that they may not have considered.[5] These experiences introduce new knowledge and can provide motivation for a student to pursue a skill or competency in greater depth. Motivation is a critical factor in the learning process, its presence or absence associated with whether an

[3] Kaplan, 2012
[4] Charlot et al, 2018; Hess & Saxberg, 2014
[5] High Resolves, 2018

individual begins or persists with learning.[6] In particular, the ability of a student to see value in a new topic is a crucial source of motivation.[7] By demonstrating the value, relevance, or urgency associated with new knowledge or skill, peak experiences are able to disrupt students' understanding of the world and instill a curiosity to learn more.

Repeated Practices are opportunities to practice a new skill or competency, beginning with the fundamentals, but increasing in difficulty and complexity over time as a skill moves from short-term memory to long-term memory.[8] For practice to be effective, it must be goal-oriented with clearly stated objectives, and challenging but achievable, with practice calibrated to current student proficiency. It should also provide multiple opportunities for focused practice that increase in complexity and challenge over time, and frequent and specific feedback that addresses both outcome and process.[9]

Real World Applications are extensions of effective practice, but which move beyond the confines of the classroom into the 'real world', providing students with opportunities and confidence to apply their skills to new challenges in ways that are both meaningful and practical.[10] Additionally, when the project-based pedagogies Composer associates with Real World Applications are aligned with the experiences and interests of students, they are able to forge links between the practiced skills and their own personal development.[11]

Curation Criteria

In addition to quality content design and different types of learning experiences, content must be curated and adapted in ways that account for the unique variability of classes and individual students.[12] In particular, Composer nudges users to analyze content through the twin lenses of cognitive load and motivation.

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Cognitive load, or the mental processing power required to complete a given task, varies by individual and context. As a result, steps should be taken to minimize the cognitive load associated with a task, focusing only on the new task or skill to be learned.[13] For example, a class in the United States studying statistics would benefit less from an example drawn from the likely unfamiliar sport of cricket.[14] Using a more familiar example, such as baseball, reduces the amount of cognitive processing power a student needs to dedicate to new topics and increases their ability to focus on the desired skill.

Motivation is the second lens through which Composer nudges students to analyze content. Whether students feel motivated to undertake a new task or topic is a critical component of student effort and uptake while learning. In addition to the degree to which students value a task,

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[6] Clark & Saxberg, 2018
[7] Ibid.
[8] High Resolves, 2018
[9] Charlot et al, 2018; Hess & Saxberg, 2014; Kaplan, 2012
[10] Charlot et al, 2018; Hess & Saxberg, 2014; Kaplan, 2012 Charlot et al, 2018; Hess & Saxberg, 2014; Kaplan, 2012
[11] Charlot et al, 2018
[12] Charlot et al, 2018 Charlot et al, 2018
[13] Ibid.
[14] Saxberg, video conference conversation, 4 June 2019

self-efficacy and the belief that their efforts can have a demonstrable effect on outcomes are critical to student motivation.[15] Consequently, content should be evaluated and adapted with these considerations in mind. Using the same example mentioned above, students from the United States might be more interested or value a statistics lesson that is edited to use baseball instead of cricket, the possible uses or applications to their lived experiences being more relevant and accessible.[16] Additionally, content can be adapted so that it remains challenging but doable or updated to include examples that help students connect the content with issues they value.[17]

Composer, through educational resources and element-level feedback and reflection, encourages users to evaluate content through these lenses, and adapt the content where necessary to ensure that it is relevant to student experiences and addresses their interests and values as learners.

Curriculum

Learning science applications are not limited to the level of content design and adaptation. In addition to its expansive content library, Composer offers a curriculum-design tool that allows users to curate and sequence the elements discussed above in order to design powerful learning arcs, called 'strings', on the platform. In order to accomplish this, the user interface incorporates features derived from research in learning science: a mastery formula that sequences the different element types described above, and the use of backwards design principles to orient learning sequences towards a set of outcomes and assessment criteria.

Mastery Formula

The Mastery Formula draws on the three types of elements described above and the learning science principles that underpin them. The formula stipulates that for every new topic or skill introduced, there should be at least one peak experience and a minimum of eight opportunities to practice, comprised of a combination of repeated practice and real-world application elements. In addition, the formula recommends that peak experiences should appear in the first third of a string, whereas Real World Applications should be positioned in the last third of a string. With each of the three elements represented, a string that adheres to the Mastery Formula integrates the critical features described above: student motivation and purpose, effective practice that increases in complexity and variety over time, and opportunities to forge connections between the new learning and its relevance to the lived experiences of students in the real world.

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[15] Clark & Saxberg, 2018
[16] Saxberg, video conference conversation, 4 June 2019
[17] Charlot et al, 2018

Backwards Design

The application of learning science in curriculum also encompasses and is enhanced by other established design approaches. In particular, the popular 'Backward Design' method, stipulates a three-step process[18]:

- Identify the desired rules or outcomes of a unit; in other words, what students will "know, understand and be able to do;"[19]
- Determine the evidence needed to assess progress towards those results; and
- Plan the learning experiences that will prepare students to achieve and demonstrate the results.

With its focus on outcome-oriented scaffolding, the Backward Design approach embodies design practices that encourages practitioners to integrate learning science principles into lesson planning. By making explicit learning objectives, teachers can sequence skill development to minimize cognitive load, help students focus attention on what content is most relevant, and provide opportunities for metacognitive reflection on progress towards individualized outcomes.[20]

Elements of the Backward Design approach have been incorporated into the curriculum-design interface of Composer, providing a framework that allows users to orient their strings towards a set of explicit outcomes, standards, and frameworks.

Delivery

Successful delivery of quality content and well-structured curricula requires that teachers be equipped with strategies rooted in the science of learning. Teacher preparation includes not just the ability to design and deliver learning experiences, but also the creation of the warm and welcoming environments that account for students' social and emotional needs in ways that optimize learning.[21] This whole-child approach to education is likewise consistent with the recent emphasis on inter- and intra-personal skill development—skills that need to be modeled by teachers in the classroom as part of a successful program of delivery.[22]

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[18] Wiggins & McTighe, 2005
[19] Ibid. p. 17
[20] Charlot et al, 2018
[21] Ibid.
[22] Reimers & Chung, 2018

Professional Development

The result is a need for teacher professional development that prepares teachers to confidently model and deliver the content of citizenship education using strategies informed by best practices derived from learning science. A study of successful teacher professional development programs that focused on 21st century skill development identified several common themes between programs: a whole-school approach that integrates support from the larger community; a focus on teachers as learners with personal and professional goals they have identified for themselves; and a focus on the acquisition of practical competencies with ample opportunities to observe, discuss, reflect, and practice new skills.[23] In other words, successful teacher professional development programs that seek to support holistic learning experiences must practice what they preach, incorporating the same principles from learning science that apply to students: motivation and value, individualization, effective practice and application.

In order to prepare teachers to deliver quality citizenship education, Composer also features a fourth 'type' of element: professional development opportunities. Just as teachers are able to access student-facing workshops and lesson materials, they are able to access workshops, trainings, courses and tools that further their own personal and professional development as citizens and learning engineers.

Collaboration

In addition to professional development, Composer offers educational resources and collaboration opportunities across the site to increase user familiarity with both the nature of citizenship content and the principles of learning science that frame the platform. User conversation, collaboration, and reflection within and between schools facilitates the development of online professional communities, contributing to teachers' and school administrators' development as professionals as they work with one another to design, implement, and evaluate strings.

Our vision for Composer is to create a global ecosystem, connected through a single comprehensive platform, where schools and organizations are empowered to search, create, deliver and share powerful sequences of citizenship education, informed by the latest insights from learning science. We believe that taking a learning science-centered approach to designing the Composer platform will be critical to its success.

High Resolves is a non-partisan, non-religious, non-profit social venture specializing in the design and delivery of immersive learning experiences around citizenship themes for young people. The Orange Papers series are designed to share our insights and learnings to advance the discourse in this important arena.

[23] Ibid.

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