Guofang Wan
Dianne M. Gut
Editors

Explorations of Educational Purpose 13

Bringing Schools into the 21st Century

Springer

Bringing Schools into the 21st Century

EXPLORATIONS OF EDUCATIONAL PURPOSE

Volume 13

Series Scope

In today's dominant modes of pedagogy, questions about issues of race, class, gender, sexuality, colonialism, religion, and other social dynamics are rarely asked. Questions about the social spaces where pedagogy takes place – in schools, media, and corporate think tanks – are not raised. And they need to be.

The *Explorations of Educational Purpose* book series can help establish a renewed interest in such questions and their centrality in the larger study of education and the preparation of teachers and other educational professionals. The editors of this series feel that education matters and that the world is in need of a rethinking of education and educational purpose.

Coming from a critical pedagogical orientation, *Explorations of Educational Purpose* aims to have the study of education transcend the trivialization that often degrades it. Rather than be content with the frivolous, scholarly lax forms of teacher education and weak teaching prevailing in the world today, we should work towards education that truly takes the unattained potential of human beings as its starting point. The series will present studies of all dimensions of education and offer alternatives. The ultimate aim of the series is to create new possibilities for people around the world who suffer under the current design of socio-political and educational institutions.

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To my 100-year old grandparents, Bohua and Jiyun, who instilled in me the values and principles of life. It is they to whom this book is dedicated by Guofang Wan.

To all the students, preservice teachers, and educators I have and will have the privilege to work with. You challenge me to be a lifelong learner, striving constantly to learn more and do more to ensure all students are prepared for their futures. (Dianne Gut)

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This book could not have been written without the help of many people. First, my deep appreciation goes to the authors who have contributed to this book by sharing their bold thinking and innovative stories. They are a virtual team spanning across the world but with the same belief that time has changed and schools need to follow. Here I especially want to remember Dr. Joe Kincheloe, the late series editor of the book and thank him for his personal encouragement and unfailing support over the years. I thank my family, my husband, Hong, and daughter, Missy, for putting up with many weekends that were taken up with my research and work on the manuscripts, as well as for a few canceled vacations without complaints. (Guofang Wan)

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Valerie Greenhill is the Chief Learning Officer of EdLeader21. She has spent the last 13 years working on how people learn, what they learn, and how policies, technologies, institutions, and communities enable it all. Previously, Valerie served as the Director of Strategic Initiatives for Partnership for 21st Century Skills, where she established and led work to integrate career and college ready skills into standards, assessment, curriculum, instruction, and professional development. She oversaw P21's involvement in the Common Core State Standards Initiative and conducted reviews of core academic subject standards in states including Wisconsin, North Carolina, New Jersey, and New York. She also focused extensively on the

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Mark Treadwell is an independent education consultant and director of Dataview Ltd in New Zealand. He has been keynote at numerous international, national, and regional conferences. His recently released books in the "Whatever!" series (2008–2009) include "Whatever: The Revolution of School v2.0", "Whatever Next! The Global, Conceptual Curriculum," "Whatever: Were We Thinking?," and "Whatever: Were Parents Thinking?" As director/part owner of Dataview, a hi-tech company based north of Auckland, NZ, he is involved in several New Zealand Ministry of Education projects. He is a member of the Ministry of Education New Zealand Curriculum Review group and a curriculum commentator for the New Zealand Ministry of Education.

Guofang Wan is Professor of Education and Associate Director for the Stevens Literacy Center at The Patton College of Education and Human Services at Ohio University. Most recently, she was recognized with the Margaret B. Lindsey Award for Distinguished Research in Teacher Education by American Association for Colleges of Teacher Education. The National Council of Teachers of English recognized her exemplary work with the Fourth Annual Media Literacy Award in 2009. Her research focuses on media literacy education, effective teaching strategies, and education of diverse students. She has authored several books, developed curriculum and published many articles in these areas.

John Watson is founder of Evergreen Consulting Associates that specializes in K-12 online education. He has helped many educational organizations launch their online programs and was instrumental in developing the company's K-12 strategy. John and Evergreen's work has been cited in the New York Times, Education Week, and eSchool News, and he has appeared on NBC Nightly News. He is the lead author of *Keeping Pace with K12 Online Learning*, the series *Promising Practices in Online Education*, six white papers written for the International Association for K-12 Online Learning (iNACOL), and numerous other reports and policy papers.

Chapter 1
Introduction

Guofang Wan and Dianne M. Gut

The most dangerous experiment we can conduct with our children is to keep schooling the same at a time when every other aspect of our society is dramatically changing.
Chris Dede, written statement to the PCST panel, 1997

The illiterate of the 21st century will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn.
Alvin Toffler

Teaching our high school students 21st Century skills is no longer an option, it is a necessity
—Steven L. Paine, West Virginia Superintendent of Schools

Today's students live in a world that is extremely fast-paced, constantly changing, increasingly culturally diverse, technologically driven, and media-saturated. All this requires a fresh set of responses from education. However, many of our schools continue to deliver a 20th century, scientific-management, factory-model of education (Shaw, 2004). We argue that education needs to be redesigned, organized, and managed with a relentless focus on student success in postsecondary education, the workplace, and community life of the 21st century.

A nationwide poll of registered voters reveals that a majority of Americans report that the kind of skills students need to be prepared for the jobs of the 21st century are different from those needed 20 years ago (the Partnership for 21st Century Skills, 2007). An extensive review of the literature about 21st century skills suggests that educational decision makers must acknowledge that the academics of yesterday are no longer sufficient for today (Lemke, Coughlin, Thadani, & Martin, 2003). The New Commission on the Skills of American Workforce (2006) concludes that we need to bring what we teach and how we teach into the 21st century.

There is growing consensus among various stakeholders, including the general public that American high schools are not adequately preparing students for

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success in the evolving 21st century (Partnership for 21st Century Skills, 2006; Wagner, 2009). Fundamental reform of education is called for by people at all levels to make the education system more robust, rigorous, and relevant for students, and to better prepare them to live, learn, work, and serve the public in a digital and global society. Skills such as global literacy, problem solving, innovation, and creativity have become critical in today's increasingly interconnected workforce and society (NCREL/Metiri, 2002; Partnership for 21st Century Skills, 2007). Currently, students need more than basic skills to compete in a global economy. Apart from high level competence in the traditional academic disciplines, students need to know more about the world, they need to learn to think outside the box, access and strategically use new sources of information, and develop good people skills (Wallis & Steptoe, 2006). Friedman (2007) also calls for action from nations to adapt to the challenging flattened world if they want to remain competitive. His call for change stems from what has been termed the *death of distance,* first driven by aviation and then by the Internet. The United States is entering a global era in which Americans will have to compete for jobs in a global marketplace—not only with their neighbors down the street, but with highly motivated, highly capable, increasingly well-educated individuals from around the world (Augustine, 2007).

This book addresses the topic of responding to the shift and moving the current educational system into the 21st century. It explores issues related to "the impact of societal shifts on education," "efforts from various levels to bring schools into the 21st century," "identifying 21st century skills," "reforming the curriculum," "creating alternative models of schooling," "innovative use of technology in education," and many others. It addresses questions like: Should schools/education systems adapt to better meet the needs of tomorrow's world and how should this be accomplished? How can society better prepare students for a changing and challenging modern world? What skills do students need to lead successful lives and become productive citizens in the 21st century? How can educators create learning environments that are relevant and meaningful for digital natives? How can/should the school curriculum be made more rigorous to meet the needs of the 21st century?

This book encourages readers to transcend the limits of their own educational experience, to think beyond familiar notions of schooling, instruction and curriculum, to consider how to best structure learning so that it will benefit future generations. We hope to fuel a wider debate on an issue that can no longer be ignored. The book encourages a deeper analysis of the existing education system, and offers practical insights into future directions focused on preparing students with 21st century skills.

The contributors to this book are leaders, pioneers, and advocates in this reform movement representing academia, government, state, private agencies, and school districts. They have been solicited because of the important role they have played and will continue to play in reframing education to meet the needs of the 21st century. This book has a U.S. educational focus but certainly presents international implications with contributions from New Zealand author and international curriculum studies.

This book is written for anyone who cares about the future of education and wishes to participate in the redesign of schooling for the next generation of learners. This is a global issue that goes beyond the boundaries of nations. It can be adopted as a textbook for undergraduate and graduate courses in teacher education, educational foundations, curriculum studies, and educational leadership. It will serve as a good reference book for educational administrators, government and state policy makers, community leaders, teachers, and parents concerned about the future education of children.

The book contains eleven chapters that range from global perspectives to individual responses—from a macro view to the micro-systems involved in the shift, from the theoretical to the practical, and from the why to the how.

Treadwell's work in New Zealand provides the global perspective to begin our discussion and has served as a leader in this international conversation. He argues in Chapter 2 that globally the web-based learning/communication environment is causing a paradigm shift that will have a profound effect on education for the next 20–50 years. His heralding of a second Renaissance period, the "Nouvelle Comprehension" [The New Understanding], provides new opportunities for educators and as he proposes, "ushers in a new paradigm around teaching and learning, setting the platform for School v2.0." The idea that more people will be able to center their workplace on their passion, what they are naturally good at, and what they would do even if they were not being paid is an appealing prospect that encourages creativity, productivity, and commitment.

In Chapter 3, Kay and Greenhill provide a framework outlining the 21st century themes and skills that, when imbedded in the core academic content, will prepare learners for success in the 21st century economy and workplace. The Partnership provides suggestions and support for states, districts, and schools to assist in planning a comprehensive approach for reforming their educational programming to incorporate 21st century learning principles and skills.

In Chapter 4, Templeton, Huffman, and Johnson profile national efforts in response to international pressures of political, economic, cultural, demographic, technological, linguistic, and environmental globalization. They highlight the accomplishments of the State of West Virginia and the model it provides for state-level reforms. Implications of "the shift" for higher education, and in particular teacher education, are explored by Johnson and Templeton in Chapter 6 as they highlight reform efforts being led by successful teacher preparation programs in Maine, Massachusetts, North Carolina, North Dakota, West Virginia, and Wisconsin.

Using Tyler's (1949) model of curriculum development and change, in Chapter 5 Wan presents the findings from a multiple stakeholder needs-assessment on American school curriculum change; recognizes the need for curriculum change to address the priorities of 21st century education; and identifies specific curricular areas in need of change by taking into consideration the needs of society, students, and subject matter.

After providing evidence of preservice teachers' ability to incorporate 21st century skills in their lesson planning and findings from an analysis of the inclusion

of 21st century themes and skills in content area lessons available from an online data base of best practice, in Chapter 7 Gut suggests several strategies that can be adopted by teachers who are ready to begin incorporating 21st century skills into their content area instruction. She provides a plethora of resources for educators looking to expand their students' skills, and create their own activities and lessons that encourage and utilize 21st century themes and skills imbedded in content area instruction.

Moving to a more specific focus on one 21st century skill, in Chapter 8 Collins, Doyon, McAuley, and Quijada from the New Mexico Media Literacy project afford a comprehensive look at media literacy from its early beginnings to its global impact and inclusion in the curriculum, underscoring the importance of teaching media literacy to today's students. In Chapter 9, Franklin follows with an examination of how mobile technologies can interface with Web 2.0 virtual environments and offers suggestions for how instruction can be made relevant to real-world activities in new and exciting ways.

In Chapter 10, an alternative approach to traditional schooling is proposed by Watson and Johnson, two K-12 online education leaders in the United States, as they describe how to deliver high quality 21st century education through the Internet to students across the United States. Online alternative schooling addresses the needs of students in rural and inner-city schools, affording opportunities to those with previously limited access.

The final chapter tells the story of how one college of education is adapting its teacher training programs to meet the unique needs of the region it serves within the 21st century context. The collaborative efforts between the region and the college provide a model of reform for teacher education framed by regional, local, community, and businesses needs for the 21st century workforce.

It is abundantly clear that the authors included in this book have made significant contributions and have paved the way for much of the current discussion regarding 21st century teaching and learning. Their insights and recommendations give guidance to all stakeholders who recognize the need to respond to the "shift" that has occurred and those seeking ideas for how to assist schools in their move into the 21st century, thereby providing the education necessary for our 21st century citizens, guaranteeing their success now and in the future.

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Chapter 2
Whatever Happened?

Mark Treadwell

Introduction

Global communication and knowledge sharing capabilities made possible via the internet have resulted in the world being on the cusp of a second Renaissance period; "**Nouvelle Compréhension**" [The New Understanding]. The capability of being able to instantly share knowledge and understanding with peers around the world propels the potential for creativity and innovation to unheard of levels. With macro paradigm shifts on this scale, there is always turbulence and upheaval as old systems give way to new ones and each social structure reorganizes and reforms itself into the required new structures. This includes political, sociological, economic, religious, scientific and technological, business, legal and education systems. The evidence for this upheaval is everywhere and is evident through casual observation and newspaper reports every day, and what we are seeing now is just the beginning. Education and more importantly, learning, sits at the pivot point of this paradigm shift. The Paradigm Shift, initiated by the Internet, coupled with fundamental shifts in our ability to access and process knowledge cheaply and effectively, provides the ability to collaborate within local, regional, national, and international contexts.

The ability to publish our ideas to a global audience and our capacity to communicate with anyone, anywhere, anytime, presents educators with the capability to radically change their teaching and learning practices. The new focus of education is on an outcome of understanding and wisdom rather than the historical end-point of knowing and remembering. "Nouvelle Compréhension." The second Renaissance will not be confined to several tens of thousands of wealthy people as in the first historical European Renaissance but rather it will be global and will include and affect billions of people. For those countries that adopt the paradigm shift "Nouvelle Compréhension" will have a profound effect on the education of learners at every level. If educators can transition their practices to focus on teaching for understanding and lifelong learning, these 21st century learners will be well prepared for the

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"real world" they will enter, live, and work in. Those countries that make the necessary infrastructure, teaching, and learning changes and facilitate environments that foster creativity and innovation, will provide the world with the creative workforce that will power economies and societies for the next 20–50 years.

Schools must now focus on innovation and setting the highest of standards, continually pushing the limits and adapting to the constantly changing world we live in. This will always involve a degree of risk but the far greater risk is to do nothing.

In order to achieve lifelong learning capability for learners, educators need to form new understandings around curriculum, assessment and e-learning environments and weld these into a framework that we can manage and implement over a number of years. In this chapter the author will introduce this paradigm shift and the resulting second renaissance and demonstrate how each of the elements relate to each other in order to provide a seamless new paradigm in teaching and learning.

Paradigm Shifts

Paradigm shifts have entered our lexicon of everyday speech, and while the initial idea was developed by Joel Barker, we now know that paradigm shifts can happen at a number of different levels. Micro paradigm shifts are changes in how we perceive and apply ideas in a singular context such as filmmaking, political systems, health breakthroughs, or new technologies such as the Internet or new materials. Macro paradigm shifts are far rarer and concurrently affect all societal systems. A single new idea may set off a micro paradigm shift, but it takes the simultaneous development of a wave of new ideas that resonate to develop a macro paradigm shift. The last macro paradigm shift gave rise to the Renaissance period 500 years ago.

Macro paradigm shifts affect every social, political, technological, financial, environmental, artistic, and business institution. Metaphorically speaking, these institutional "playing cards" are put back in the pack, the deck is reshuffled, and the cards are re-dealt to the players with their "luck" dependent on their ability to adapt and make use of creative innovation. Currently, the world is experiencing the largest macro paradigm shift of all time, one that will dwarf the Renaissance period in both the number of people involved and the extent and implications of ideas generated. It will impact every known institution on a scale humankind has never experienced. The industrial revolution changed workplaces through the advent of new technological systems but left many of the other (financial, sociological, environmental, political, and artistic) systems relatively untouched. Accordingly, the industrial revolution was a micro paradigm shift.

Generally speaking, a paradigm shift follows a developmental cycle and provides the *potential* for increased efficiency and effectiveness within each of the contributing systems/institutions. Human nature is not adorned with an abundance of logical, sensible, and rational behaviors. Thankfully, humans have a tendency to be swayed by passion and non-rational thinking! The upshot is that even when faced with the opportunity to increase our efficiency and effectiveness we may not necessarily act on the opportunity due to fears, uncertainty, and lack of political risk taking. Our

passionate and non-rational nature makes us thoroughly entertaining, wonderful company, totally frustrating, and in the same moment impossible to live with and without. However, when it comes to paradigm shifts, human nature can either come to the rescue in our search for the future or cause us to seek the perceived security of the past.

Paradigm shifts are driven by the development of new ideas stimulated by new technologies, political processes, social pressures, and changes in societal values and beliefs that prompt the ability to think, learn, and develop creative and innovative products, systems, and environments. The sigmoid curve (Fig. 2.1) represents the generic potential increases in effectiveness of *learning* and the development of new ideas that change the way we learn. Potential effectiveness gains initially track slowly followed by a rapid rate of change indicated by the increasing slope of the line (calculus 101). After an initial burst of new ideas about how we learn at the beginning of the Renaissance (spread over almost 150 years), the rate of change decreased quickly and subsequently plateaued. The last 40 years of education appear to have changed dramatically, but surprisingly, the overall improvement in reading, writing, mathematics, and science test scores have been less than 0.5% as measured by The International Center for Education Statistics. This does not mean new education ideas were not being developed and deployed, but rather they did not significantly increase the effectiveness or the efficiency of the learning processes that we measured!

The period of rapid rate change that drove a reconceptualization of ideas about learning is termed the Renaissance period. The Renaissance period represented a number of micro paradigm shifts that resonated in order to develop a macro

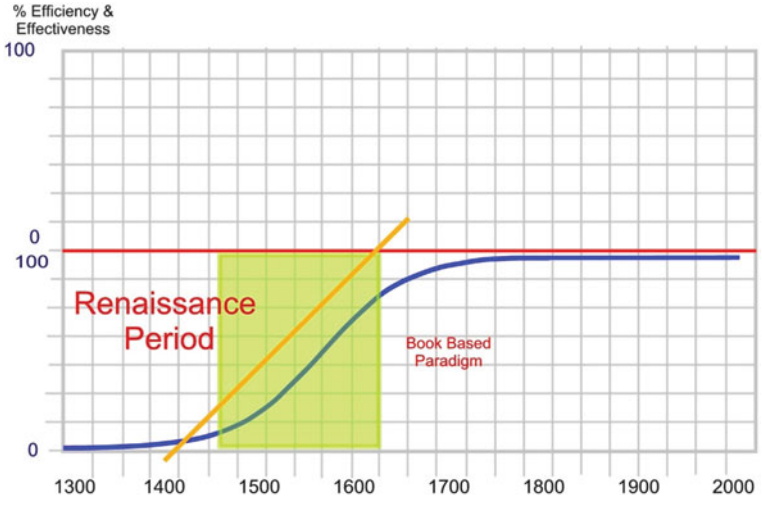

Fig. 2.1 The sigmoid curve

paradigm shift around how learning happened. The key micro paradigm shifts included the following:

- the invention of the printing press: lowered the cost and increased the portability of knowledge via the technology of the printed book
- the dramatic increase in trade: led to new ideas around learning brought from other cultures and provided significant increases in wealth outside of traditional monarchies and political systems broadening the wealth base
- the reformation: allowed people to think thoughts and discuss ideas outside of the canonical knowledge that had been previously decreed by "the church" as the only true knowledge
- people being paid to think: wealthy monarchies, traders, and entrepreneurs were paying people just to think about new ideas across the arts, humanities, sciences, and technologies
- drift to the city: cities drew people into closer contact allowing for collaboration, a higher rate of diffusion and acceptance of new ideas, and the eventual formalization of learning.

Each of these factors and others resonated to bring about the Renaissance period. Following the Renaissance, a variety of sociological and political events unfolded that caused countries to look inwardly, and the rate of change quickly died off. As mentioned earlier, the Industrial Revolution caused another micro paradigm shift as did the invention of the microcomputer; however, throughout both of these micro shifts most institutional systems continued in their present form. The key to the Renaissance was the underlying increase in effectiveness and efficiency of learning, which drove a transformation in all societal structures.

Generally speaking, when one paradigm shift plateaus for some time (as it approaches its upper limit of effectiveness and efficiency), a new macro paradigm shift emerges, driven by a new set of resonant micro paradigm shifts. In late 1999, a new macro paradigm shift was predicted to emerge in 2005 driven by the technology of the Internet. Other factors would contribute, but the Internet would be the primary initiator of the new macro paradigm. It was also predicted that this paradigm shift would mature by 2020. What this means is that by 2020 the potential exists for any country/citizen to adopt the underlying drivers of this macro paradigm shift and benefit from them (Fig. 2.2).

In the new paradigm shift, the five factors driving the first Renaissance period are once again at play, but on a scale that would dwarf what happened in the 14th and 15th centuries. Another difference is this shift would not take place in an exclusively European context, but rather would be played out within a global context. Furthermore, the ruling elite would not be controlling these processes as they did in the first Renaissance period; in this macro paradigm shift egalitarianism rules.

Macro paradigm shifts on this scale are underpinned by a fundamental technological driver, and in this new paradigm, the driving technology is the Internet, supported by a cast of micro, but equally critical, drivers which also underpinned the first Renaissance. The new drivers are as follows:

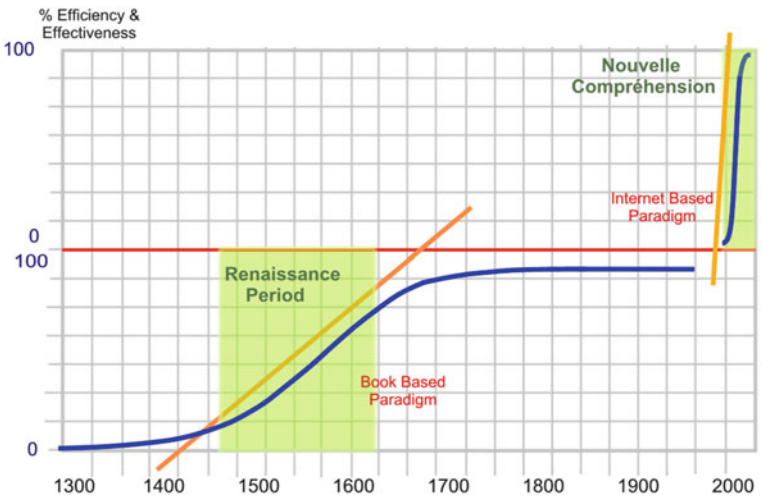

Fig. 2.2 New paradigm shift 2005–2020

- The invention and the *widespread adoption of the Internet*: the Internet is a combination of vast amounts of information, coupled with research, communication, collaboration, and publishing tools, accompanied by a significant reduction in the costs of these services while simultaneously, significantly increasing efficiency and effectiveness.
- The *dramatic increase in trade*: the reduction in trade barriers and increased efficiency and effectiveness of trade. The Achilles heel of this dramatic upswing is reliance on a limited resource—oil, and finding a replacement is now a global imperative.
- The ability to *publish to Anyone, Anywhere*, *and at Anytime* through blogging, e-mail, social networking sites, sharing photographs online, YouTube videos, and iTunes podcasts . . . Ideas can now be published to global audiences at almost no cost.
- People being *paid to think*: we have more researchers now than at any point in history; who have better and easier access to vast online multimedia resources.
- The drift to the city: large cities (greater than 0.5 million inhabitants) accommodate 75% of all the people on the planet. People are able to *collaborate with Anyone, Anywhere,* and *at Anytime* in order to share, brainstorm, and publish their ideas in very short time frames.

This paradigm shift will have an effect on every institutional structure across the globe, and education is the pivotal point about which this paradigm shift will unfurl. In fact, successful education systems should (and probably will) become the vector that initiates the full emergence of a second Renaissance period: "Nouvelle Compréhension," or the new understanding. In order for the second paradigm shift to take place, a reconceptualization of how humankind thinks and learns must occur.

If education is to be the vector in this dramatic unfolding of the new paradigm, then we have to reevaluate the purpose and scope of education systems.

During the latter 300 years of the previous paradigm shift, the rate of change within education dropped off dramatically and the purpose of education became "knowing stuff" and reproducing that information in summative testing environments. The education race has become focused on who can remember the most as opposed to who can develop, debate, create, and innovate new ideas, and take the risk of presenting those ideas with the aim of expanding and developing them further. To accomplish this, the process we often flippantly refer to as "thinking" must be understood.

The Personalized Curriculum

Personalized learning has become a common catchphrase, but many have interpreted it as individualized learning; however, that interpretation should be questioned. In current education systems, *what* [knowledge] needs to be learned is highlighted, and the beginning of the learner's journey, followed by *how* [methodology] this should be taught. From there the *why* [purpose] this knowledge needs to be learned is sometimes justified, and finally *who* [connections] will be learning what needs to be learned is considered (Parata, 2006, personal communication). Because the *what* and the *why* have already been decided, the question of *who* is automatically reduced to a collective of all the learners present in classrooms.

Personalized learning reverses this sequence and begins with the personal [connections], i.e., *who* is in front of us, *what* their learning needs are, and *how* their capabilities, gifts, and talents can be best amplified and supported. What the learners already understand must be considered in order to chart their future learning. The first task is to connect with learners, to find out who they are, and to understand their worldview and past learning achievements. Next is to move from the *who* into the *why* and see how the learners can meet the purpose of 'why they are in school'. To understand our learners, and why they have been given into our care, we must access and interpret the data that accompanies them. This data should provide insights into their past experiences which in turn generates a formative framework for how to achieve [methodology] the purpose of the school—the *how*. The final element to be considered is *what* knowledge the learners need to learn so that they can build knowledge into understanding and apply it across a range of increasingly challenging contexts.

Building understanding requires discipline and perseverance, as well as the ability to interrogate, manipulate, and apply knowledge through inquiry-learning processes. Inquiry learning allows the learner to develop the required understanding and apply it utilizing innovative, creative solutions and applications. Inquiry relies on both the learner and the educator being able to ask clever, rich, open, and higher order thinking questions to drive the interrogation of the knowledge and build the understanding that is required. In this process, the learner must be provided with as much opportunity as possible to work collaboratively within rich information and communication environments, challenging them to be innovative and creative

Fig. 2.3 Understanding

in applying their ideas within their local, regional, national, and global communities (Fig. 2.3).

In order to be more efficient and effective in providing learning opportunities, educators must be strategic about the conceptual level of the work presented to learners. Too often learners are expected to understand concepts that are "out of their depth" in terms of their cognitive ability to understand these ideas. Providing appropriate concepts requires educators to have a much better understanding of "who is in the classroom" and determining their actual capacity for learning. Educators need access to accurate and reliable data in order to accomplish these goals.

To understand *who* is in front of them, educators need to know what learners know, what they understand, what competencies they have (and at what level), and their thinking in regards to principles and character. Accurate and reliable data comes in several forms:

- *Diagnostic Assessment*: provides an indication of a learner's aptitude and preparedness for a unit or program of study and identifies possible learning gaps that require remediation
- *Formative Assessment*: provides learners with feedback on progress and informs them on how they may develop their present knowledge and understanding
- *Summative Assessment*: provides a relative measure of achievement regarding a learner's performance in relation to the intended learning outcomes of the unit or program of study
- *Reflective Assessment*: by reflecting on their work and presenting those reflections to an audience, learners carry out a reflective inquiry into how they engage their thinking and learning processes, competencies, principles, and character

Presently the dominant assessment in most education systems is summative. Unfortunately, on its own, this approach provides historical data about what happened in the past and is not a good indication of what could or should happen next. It