THE CONTRIBUTION OF ALTERNATIVE EDUCATION
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This chapter introduces the concept of alternative education in its various different forms and approaches. The author explores the context, history and development of several alternative forms of education utilised worldwide. In addition she explores the notions of the culture of learning for each, including the conception of the learner, realisation of the learning environment, role of teachers, curricula and culture of assessment. The chapter also calls for a reassessment of alternative models of education in light of what the learning sciences reveal on cognitive and social processes which result in effective learning.

Alternative education: a fragmented landscape

Lacking a precise meaning, the term "alternative education" describes different approaches to teaching and learning other than state-provided mainstream education, usually in the form of public or private schools with a special, often innovative curriculum and a flexible programme of study which is based to a large extent on the individual student's interests and needs (Raywid, 1988; Koetzsch, 1997; Aron, 2003; Carnie 2003). Although in its broadest sense, the term "alternative education" covers all educational activities that fall outside the traditional school system (including special programmes for school dropouts and gifted students, home schooling, etc.) this paper focuses on models of schooling that have paved the way for alternatives to mainstream school systems provided by the State.

Across the world, we find a broad range of alternative forms of education rooted in different philosophies. Thus, the landscape of alternative education is highly fragmented, which makes it difficult to quantify the number of students in alternative schools and programmes. Large, global networks of alternative schools based on particular educational concepts such as Montessori and Waldorf/Steiner pedagogy coexist with some new movements in alternative schooling as well as individual alternative schools. In addition, several OECD school systems have created legislation that makes room for and funds alternative schools and education programmes within public school systems (Rofes and Stulberg, 2004).

Historically, alternative models of education have coexisted with the public education system ever since its inception in the first half of the 19th century (Raywid, 1999). Attempts by the state to provide a common, culturally unifying education for all children have provoked the response of educators, parents and students who have declined to participate in these systems. Their reasons are manifold, and the forms of schooling (and non-schooling) they designed are equally diverse. "The history of alternative education is a colourful story of social reformers and individualists, religious believers and romantics" (Miller, 2007). In the United States, for example, Horace Mann's pioneering efforts to centralise public schooling were opposed from the start by religious leaders and other critics who perceived education to be a personal, family and community endeavour, not a

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political programme to be mandated by the State. Many critics of the public school system referred to Jean-Jacques Rousseau's *Émile*, published in 1762, in which he argued that education should follow the child's innate growth rather than the demands of society. Throughout the 19th century, education reformers in several countries accused their state school systems of disciplining young people for the sake of political and social uniformity and the success of an emerging industrial society. Bronson Alcott, for example, started the Temple School in Boston as early as 1834 because he rejected the rote memorisation and recitation predominant at early American schools.

The first decades of the 20th century saw the advent of several alternative education movements that proved to be influential even today. With her influential book *The Century of the Child* (1909), the Swedish educator Ellen Key was among the first of several advocates of child-centred education. The German education reformers Hermann Lietz, Paul Geheeb and Kurt Hahn founded reformist rural boarding schools ("*Landerziehungsheime*") that were meant to provide children with a holistic education secluded from the negative effects of industrial urban life. In 1907, the Italian paediatrician Maria Montessori opened the first *Casa de Bambini*, a house of elementary education based on her own observations in child development. The first Waldorf school was founded by Austrian philosopher Rudolf Steiner in 1919. Because of official criticism of his innovative teaching methods, French educator, Célestin Freinet in 1935 resigned from his job as public school teacher to start his own school in Vence. In North America, John Dewey, Francis Parker and others formed a powerful progressive education movement based on the belief that education should primarily serve the needs of children and focus on understanding, action and experience rather than rote knowledge and memorisation.

During the 1960s and 1970s, alternative education grew into a widespread social movement. Writers like Ivan Illich, A.S. Neill and Hartmut von Hentig in Europe, John Holt, Jonathan Kozol and Herbert Kohl in the United States and Paulo Freire in Brazil questioned the values and methods of public schooling. The period between 1967 and 1972 in particular saw profound criticism of public education, resulting in student demonstrations and teacher strikes in many countries. As a result, the first magnet schools were introduced in the US public school system. By the 1990s, the transformation of the industrial to a knowledge economy had stimulated a debate about the future of the standard model of schooling (Bransford, Brown and Cocking, 2000; Bereiter, 2002; Hargreaves, 2003). In recent years, several OECD school systems have made provisions for the greater autonomy of state schools and some countries have made it possible for parents and innovative educators to receive public funding for the foundation of schools with special profiles, such as Charter schools in the United States and Alberta, Canada, Foundation schools in England or Designated Character schools in New Zealand. With the beginning of the 21st century, many teaching practices developed in alternative schools, such as student-centred and independent learning, project-based and cooperative learning, as well as authentic assessment seem to have gone mainstream by influencing the culture of public education.

Global networks of alternative schools

Montessori schools (Lillard, 1996; Kahn, Dubble and Pendleton, 1999; Seldin and Epstein, 2003) pursue an educational philosophy and methodology, characterised by a special set of didactic materials, multi-age classrooms, student-chosen work in longer time blocks, a collaborative environment with student mentors, absence of testing and grades, and individual and small group instruction in academic and social skills. The programme name is not copyrighted and many mainstream schools across the world have now adopted parts of the Montessori methodology. Most schools entirely built on the Montessori methodology and philosophy are, however, organised in international and national networks such as the International Montessori Council or the American Montessori Society.

Waldorf schools (Petrash, 2002; Clouder and Rawson, 2003; Masters, 2005) also known as Steiner schools, are based on the educational ideas of the philosopher Rudolf Steiner. Waldorf education is currently practiced in kindergartens and schools in 60 countries and is thus, together

with Montessori education, the predominant form of alternative education around the globe. Waldorf education aims at developing children and adolescents into free, moral and integrated individuals through integrating practical, artistic and intellectual approaches into the teaching of all subjects.

Round Square Schools (Tacy, 2006), of which there are currently about 50 on all five continents, are based on concepts of experiential educational developed by Kurt Hahn, who believed that schools prepare students for life by experiencing it in authentic learning situations as generated by work projects, community services, leadership training, international exchanges and different forms of outdoor exploration and adventure. All Round Square Schools emphasise learning through doing with the aim of developing every student academically, physically, culturally and spiritually, through a process of self-confrontation and self-formation within the supportive environment of a school community.

Free or democratic schools (Lamb, 1995; Gribble, 1998) are organised around the principles of autonomy and democracy. The oldest democratic school, Summerhill, a boarding school in Southern England, was founded in 1921 by the Scottish teacher A.S. Neill. Sudbury Valley School, radically democratic school in Massachusetts/USA, has served as a model for many subsequent democratic schools. Today, about 100 schools around the world describe themselves as "free" or "democratic" schools. Since 1993, free schools have formed a loose network. While official rules about the organisational principles of democratic or free schools would contradict the schools' independent spirit, they share many common characteristics: decisions about the school are taken by a self-governing school body, in which each student and each teacher has one vote in a majority voting system.

Escuelas Nuevas are alternative schools based on the idea of improved rural and urban basic education for children from low-income families. Started in 1987, there are now more than 20 000 *Escuelas Nuevas* in Colombia as well as in 14 other Latin American countries, the Philippines and Uganda – schools that have proven to be effective according to the World Bank and UNESCO, among others. The schools' pedagogy emphasises respect for the rights of children and is based on innovative educational projects involving a range of educational materials that encourage collaborative, participatory and personalised teaching methods. Schools are organised as community schools, involving the wider community as well as students' families who are invited to play an active role in school activities and their child's learning.

In addition to the alternative schools that are part of broader networks, there are numerous individual alternative schools across the world. The following examples show the variety of pedagogical approaches realised at these schools:

- Brockwood Park School, founded by the Indian philosopher and educator Jiddu Krishnamurti in 1969, has a strong ethical base and focuses on both academic excellence as well as spiritual development through exploring the balance between freedom and responsibility, meditation freeing from self-centred action and inner conflict as well as appreciation and conservation of nature.

- The American educational reformer Helen Pankhurst developed the Dalton Laboratory Plan (1922), which enables students to work independently on the basis of a contract, within the public school system. Today Dalton schools exist in Australia, the United States, Japan, Russia, Central Europe, England, Germany and the Netherlands.

- Schools modelled on the pedagogy of French educator Célestin Freinet (Acker, 2007) see the child's interest and natural curiosity as a starting point for learning and attempt to use real experiences of children as authentic opportunities for learning. Children are encouraged to learn by cooperatively making products or providing services. In Freinet schools, students are familiarised with democratic self-government to take responsibility for themselves and for their community. Today, Freinet schools exist mostly in France, Belgium and Germany, often as alternative schools within the public school system.

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- Peter Petersen's Jenaplan-Schule (Hansen-Schaberg and Schonig, 1997), founded as a progressive education project in 1927, is based on three core ideas: autonomous student work, living and learning in a community, and students and parent participation in school life. Learning takes place in mixed-age-groups. A typical school day consists of a 100-minute block, in which students work on an interdisciplinary project, autonomous student work on self-chosen projects as well as ritualised times of deliberation, play and celebration. Today, schools modelled on the original Jenaplan exist in Germany and the Netherlands but do not form an organised network.

While most alternative education models described so far are rooted in the progressivist education movement of the 20th century, two recently founded alternative schools, the Swiss Institut Beatenberg and the Canadian PROTIC, serve as examples of 21st century models of alternative education, based on constructivist theories of learning:

- Institut Beatenberg focuses on the organisation of student self-efficacy and meta-cognition, thus laying a foundation for lifelong learning. Students learn alone or in small groups on self-designed learning projects coached by their teachers. They evaluate their work aided by rubrics and document learning processes and results in portfolios. "Intensive training sessions" and "special learning days" offer structured opportunities for skill development and knowledge acquisition in small-group-settings.

- PROTIC, an alternative school within a state school in Quebec City, Canada, was founded in response to parent demand for modern, constructivist forms of learning. It organises the development of social, cognitive and meta-cognitive competences through ICT-supported interdisciplinary learning projects. In small groups, students solve interdisciplinary problems by means of active research, investigation and experimentation, complementary group work and the presentation of results. Self and peer evaluation using rubrics and portfolios serve to develop meta-cognitive skills seen as a prerequisite for lifelong learning.

Understanding the culture of learning in alternative forms of education

The conception of the learner

Even if all alternative models of education perceive and organise learning as an active process based on the needs and interests of individual students, their conception of the learner differs to some extent:

- Montessori pedagogy views children as competent beings capable of self-directed learning who learn in a distinctly different way from adults. Whereas learning for adults is often a deliberate and planned process requiring intention and discipline, their "absorbent mind" lets infants and children learn naturally through interaction with their environment. In their development, children go through different sensitive periods, during which they are particularly open to learning specific skills. According to Montessori pedagogy, learning is stimulated best through the provision of a prepared environment enriched by didactic materials inviting exploration. For much of the time during the school day, students in Montessori schools are encouraged to select work that captures their interest and attention. Through active learning children acquire basic concepts in various knowledge domains. Repetition of activities is considered an integral part of the learning process, and children are allowed to repeat activities as often as they wish. If a child expresses boredom because of the repetition, the child is considered to be ready for new didactic material on the next level of learning. While there is a specific sequence of activities, there is no prescribed timetable, so that children can move through all activities at their own pace.

- Waldorf/Steiner pedagogy is based on seven-year developmental stages with particular perceptions of the learner: During early childhood, children's learning is seen as

predominantly sensory-based, experiential and imitative, so that learning through doing is considered most effective. From age 7 to 14, learning is seen to be naturally imaginative, so Waldorf schools focus on developing children's emotional life and artistic expression. The gradual evolution of the capacity for abstract and conceptual thinking and moral judgement during adolescence (age 15 to 21) requires learning through intellectual understanding in integrated and partially self-initiated learning projects and active social responsibility through community service.

- Students in Round Square Schools benefit primarily from a variety of experiences that challenge them to confront and learn about their own person in a transformational way. Experiences are intentionally designed to instil moral values and to develop a range of attitudes and skills. Through confronting uncertain outcomes and acceptable risks during adventure-like outdoor activities in groups, adolescents develop tenacity, self-knowledge, physical fitness and the ability to go beyond self-imposed limitations. In heterogeneous groups, they best understand the benefits of different strengths, ideas and perspectives for mutual problem solving. Social and environmental community services instil in students a sense of responsibility and compassion for their community and the wider world and develop their capacity for leadership.

Primarily fostering an intrinsic motivation to learn, different types of alternative schools provide a considerable range of freedom to their students within reasonable limits of appropriate behaviour. Montessori schools encourage students to move about freely in their classrooms. Dalton, Freinet, Jenaplan, Steiner and other alternative schools encourage active learning in partially or fully self-directed activities. Students are encouraged to select their own work and to continue work on chosen projects over spans of hours, days, weeks and, sometimes, months.

The most radical vision of the student as a self-responsible and intrinsically motivated individual exists in democratic or free schools. In Sands school, for example, a second-generation English democratic school, founded in 1987, children are encouraged to take responsibility for their own learning. Sands has timetabled lessons like traditional schools, but leaves it open to children to decide which courses they choose to attend. Before choosing a subject, students are encouraged to sit with their academic tutors to find out about the course. When a student commits to a subject, he or she is then expected to attend all of its lessons. If students choose not to study a subject, leaving them with a gap in their personal timetable, they are encouraged to find a constructive activity to fill that time.

The Beach School in Toronto, Ontario is based on the idea that self-initiated learning produces the most meaningful and lasting results for students. Students decide how they would like to spend their time at the school. Teachers serve as role models and resources. Every day, students determine their own activities, set goals and develop schedules and evaluate progress in order to acquire skills such as self-motivation, self-evaluation, goal-setting, creativity, time-management, persistence and leadership. The school's philosophy is that learning how to learn is more important than learning a specific skill at a certain age. By giving students the freedom to explore various aspects of their culture and environment at will, students are expected to realise that they need basic skills such as reading, writing and mathematics to fulfil their own goals in life. Providing resources for students to learn those basics at their own pace is seen as the most effective way to tap intrinsic motivation and to motivate students to challenge themselves.

Like Tamariki School, a free school in Christchurch, New Zealand, many alternative schools try to make sure that children always work at their individual level of competence. The focus of teaching strategies is to acknowledge and support what children do well, and to use these strengths in areas of weakness. It is the teachers' responsibility to ensure that any lesson is appropriate to the child requesting it, that the child's individual needs are taken into account and to assist the child to identify their next steps in learning.

The learning environment

The traditional set-up of classrooms with desks arranged in rows, an exposed teacher's desk and a board in the front of the room has been deliberately discontinued by all alternative schools. Their learning environments are set up to put the learner centre stage, to provide a wide array of learning resources and to facilitate individual as well as collaborative learning. As alternative models of education tend to emphasise the interrelation between effective learning and the learner's emotional well-being, they often pay special attention to the aesthetic side of learning environments. Waldorf school architecture often takes up organic shapes and forms, such as rounded walls. As Waldorf attempts to educate the whole human being, "head, heart and hands", through an integrated curriculum emphasising imagination, the set-up of Waldorf classrooms reflects the broad range of creative and artistic approaches to learning through colour and form (using paint, clay, wood and metal), drama, bodily movement, singing and dance. The systematic display of students' work is a core feature of many alternative learning environments.

Maria Montessori claimed that the design of schools was to transcend functionality to create spaces matching children's needs (DeJesus, 2000). Thus, in Montessori pedagogy learning takes place in classrooms which are "bright, warm, and inviting, filled with plants, animals, art, music, and books" (Montessori Way, p. 247), both comfortable and allowing a maximum amount of independence. Children learn through active discovery of their environment, in which didactic materials are presented in a stimulating and challenging way. Montessori classrooms are organised into several curriculum areas, each of which is made up of one or more shelf units, cabinets and display tables with a wide variety of materials on open display, ready for use as students select them. As children are seen as learning through discovery, learning materials are self-contained and self-correcting as much as possible. Many of the didactic materials are specific in design, conforming to exact dimensions, and each activity is designed to focus on a single skill, concept or exercise. Other materials are often constructed by teachers themselves and tend to be made of natural materials. In addition, most classrooms include a library as well as ways for the children to interact with the natural world, usually through a classroom pet or a small garden.

Whereas Waldorf education objects to the use of computers in learning environments up to grade eight, modern Montessori classrooms, even on the elementary level, often include ICT learning opportunities. In Montessori schools, students will typically be found scattered around the classroom, working alone or with one or two others. Montessori schools work with mixed-age groups, with each classroom including an approximately three-year age range. This system is seen to enhance flexibility in learning pace and to create a non-competitive atmosphere of mutual learning and support allowing children to teach others by sharing what they have learned.

As students at alternative schools are given considerable freedom to choose learning activities they desire, or feel the need, to do, alternative education often uses the community as a deliberate extension to the classroom, and students use various in-school and community resources including people, natural resources and cultural institutions to enrich their own learning.

The role of teachers

As can be seen from the various pathways in teacher education for alternative schools, there is no uniform definition of "the teacher" in alternative education. Given the range of different conceptions of learning and teaching in alternative schools, it is easier to describe what a teacher in alternative education is not: As all models of alternative education are learner-focused, teachers are never seen as mere agents of curriculum delivery. With varying degrees of intervention, the teacher role ranges from being a coach on the side that students can draw on (but do not have to) to a provider, organiser and manager of customised learning in experiential learning environments.

The least interventionist teacher's role can be found in democratic or free schools. At Summerhill, for example, teachers teach classes at scheduled times but students get to decide

whether they attend the classes. The Swiss Institut Beatenberg defines teachers as "personal coaches" who, in one-to-one sessions, help individual children understand their own learning and motivation and set aims for themselves.

Tamariki School in Christchurch, New Zealand has developed explicit guidelines that reflect the demanding role of teachers in free/democratic schools: children's learning is to be under their own control to a large extent. It is the teacher's responsibility to work at the balance between support and intrusion and to know when not to interfere with a child's activity. Any teacher-initiated activities are to be introduced in a non-invasive way, *e.g.* by having materials available when children are ready for a lesson. Teachers are to recognise and follow up the child's interests and needs and, when appropriate, to assist the child in articulating these. Children are free to choose what teacher to work with so that teachers need to be able to recognise when a child may wish to work with a different teacher. To resolve conflicts, teachers have to use an elaborate system of requests and meetings, in which a teacher has the same rights as a child. Play is regarded as children's *work*, and it is thus the teacher's responsibility to provide an environment in which activities may be carried through to their natural conclusion and not be interrupted arbitrarily by adult demands. If they request them, children alone or in groups receive lessons in language and maths, for which teachers have to be available and prepared. Special programmes are, however, offered for those children who are not showing any literacy or numeracy skills by the age 7 1/2.

The Waldorf-Steiner pedagogy with its strong focus on students' emotional and ethical development emphasises longer-term student-teacher relationships that allow teachers to respond better to each child's emotional and developmental needs. The so-called "class teacher" often teaches the same group of children for up to eight years. The schools' holistic approach of curriculum delivery requires that teachers integrate teaching methods and materials in creative ways based on their own judgement. A class teacher is responsible for a two-hour "main lesson" every morning and usually for one or two lessons later in the day. During the main lesson, the teacher tries to integrate several of the core academic subjects with imaginative and creative activities such as painting, music and drama.

The role of teachers in Montessori schools is more indirect: one of their main tasks is to prepare a stimulating learning environment consisting of self-contained and self-correcting learning materials adequate for the developmental stage particular children are in. Whereas materials for younger children can often be bought ready-made, Montessori teachers at higher grade levels spend considerable time creating learning materials fitting the particular needs of a diversified curriculum and growing student capacities.

Several alternative schools have abandoned the one teacher per classroom tradition. In most Montessori classrooms there is a lead teacher supported by a second teacher or an assistant. Teachers will normally be working with one or two children at a time, advising and observing students working individually or in small self-selected groups. At many alternative schools, teachers spend more time mentoring and facilitating the learning process of individuals or small groups than directly giving lessons. In a school based on the concept of customised learning for individual children, teachers require significant diagnostic skills as they have to present individual students with new challenging material based on the competence level they have achieved.

Many alternative schools make room for experiential education in larger projects. At Round Square and Outward Bound schools, this is the predominant pedagogic approach. Experiential education is a methodology in which teachers purposefully engage with learners in hands-on experiences and focused reflection in order to increase knowledge, develop skills and clarify values. Teachers arrange challenging experiences, in which learners are able to take initiative, make decisions and are accountable for results. It is the teacher's task to pose problems and support learners during the process of learning though doing and experience, insuring their physical and emotional safety. A key teacher competence lies in recognising authentic learning opportunities. As the possibility to learn from natural consequences, mistakes and successes are seen as main benefits

attributed to authentic experience and problem solving, teachers need to be able to deal with ambiguity, uncertainty, risk and failure in a professional manner.

Curricula and the content of learning

Most alternative schools enjoy considerable freedom in the design of their curricula. The older the students, however, that they teach, the more schools tend to align core content of their teaching with central exams and state requirements. A noticeable commonality between most alternative schools is their attempt to teach an integrated curriculum that does not strictly separate traditional subject areas but rather emphasises the interconnections between the disciplines. The Montessori curriculum follows an integrated thematic approach, tying together separate disciplines into studies of the physical universe, the world of nature and the human experience. In the prepared learning environment typical of Montessori schools, children proceed at their own pace from concrete objects and tactile experiences to abstract thinking, writing, reading, science and mathematics. Each activity leads to a new level of learning. The core purpose of the hands-on math materials, for example, is to make abstract concepts clear and concrete, to lay the foundation for cognitive development and to prepare for the gradual transition to abstract thinking. In language development, didactic material foster lexicon development, communication skills, writing and reading readiness. Science, as an integral part of the Montessori curriculum, teaches gathering information, thinking and structured problem solving. Music and the Arts offer children ways to express themselves, their feelings, experiences and ideas.

The curriculum at Waldorf schools is organised as an ascending spiral: a long lesson starts off each day, focusing on one subject for a block of several weeks. Each subject is introduced in a particular grade and is subsequently taught in a block of several weeks on a slightly higher level each year. All students participate in all basic subjects regardless of their talent or interest because Waldorf education commits to the idea that every human being needs a broad basic understanding of the world. In addition, older students in Waldorf schools pursue special projects and can choose from a range of electives. The Waldorf curriculum is built on the concepts of vertical and horizontal education. The ascending spiral of the curriculum offers a vertical integration of subject knowledge from year to year. Horizontal integration is achieved through integrating cognitive learning with the arts and practical skills at every stage. Children are to experience that everybody can strive for a unity of knowledge and experience. The long main lesson allows teachers to develop a wide variety of activities around the subject taught. After the day's lesson, which includes a review of earlier learning, students record what they learned in their notebooks. Following a break, teachers present shorter lessons with a less project-based and more instructional character. Foreign languages are taught starting in first grade, typically later in the morning. Afternoons are devoted to lessons in which the children are active in the arts and crafts.

Dalton schools try to individualise learning as much as possible within a defined but flexible curriculum. In all subject areas, learning takes place on a one-to-one basis, in small groups or as part of whole class activities. Whenever possible, children are encouraged to become active and independent learners, writing their own little books, undertaking independent research projects in social studies and science, conducting community service projects, painting a mural or performing in a dance project.

In free schools such as Summerhill or Sands, both teachers and students are curriculum resources. Teachers often contribute more than just the subject area they are experts in. They are required to act as learning coaches, helping students to learn whatever they are interested in. Just like in mainstream schools, students at Summerhill have a timetable, but classes and projects are non-compulsory. At the beginning of term all students receive blank timetables on which they devise their individual lesson plans. Children below the age of 12 have their own teachers and classrooms with multi-activity spaces. Teachers provide a timetable for the week and organise activities in response to the children's needs and wishes. Older students sign up at the beginning of term for a wide variety of subjects and projects. The idea is to allow the students to make informed

choices within the context of a structured day. All Summerhill teachers have considerable freedom concerning teaching methods and objectives, but are assisted by curriculum advisors who discuss teaching aims, methods and practices. Senior teachers are expected to be able to teach their subjects at the level of the national exams for 16-year-olds. Although Summerhill offers more or less the same formal subjects as most traditional schools, students and teachers offer a variety of projects and activities that can be selected within the timetable ranging from "airplane construction" to "making a radio play".

At Institut Beatenberg in Switzerland, the curriculum is passed on through elaborate rubrics that define competence levels in various subject areas. With the help of their "learning coach", students are encouraged to identify the level they are on and to set specific and measurable goals for themselves on how to achieve the next level. At the beginning of every week, students write down these goals in a weekly learning plan and with the help of their learning coaches formulate specific activities to work on alone or in small groups. In addition to these self-directed learning activities, teacher-led intensive trainings and special learning days help scaffold the development of skills and the acquisition of knowledge.

The function and culture of assessment

Alternative schools share the conviction that children and adolescents learn most effectively when they are interested in and motivated for a topic or a project. For obvious reasons, this core paradigm of alternative education shapes the form, function and culture of assessment in alternative schools. This orientation towards fostering intrinsic rather than extrinsic motivation influences the design of learning environments and the devolution of freedom, choice and responsibility to students. All alternative schools focus on the individual child and his or her specific talents, interests, learning style and learning speed. Social comparison between children is discouraged and for that reason, traditional forms of testing and summative assessments are objected to, given the social benchmarking they invite. Summerhill, for example, does not send reports to parents unless both children and parents actively ask for feedback.

Alternative schools tend to focus on individual and criterion-referenced forms of assessment, such as learning reports, learning logs and portfolios, in which students document and reflect their own learning. In Waldorf pedagogy, for example, standardised testing is considered problematic, especially in the elementary years, because it is believed that such testing does not measure valuable attributes of children such as curiosity and initiative, creativity and imagination, good will and ethical reflection. The Montessori method also discourages traditional measurements of achievement such as grades and tests as potentially damaging to a child's self-concept. By reason of their critical perspective on traditional summative assessment, alternative schools have devoted considerable thought and creativity to developing, testing and improving alternative forms of assessment suitable to their overall philosophy. Many of the so-called "authentic forms" of assessment that are used in mainstream education today originated in alternative schools. Alternative schools have developed elaborate forms of feedback and qualitative analysis of students' performances, which tend to be provided either as lists or rubrics of skills, activities and critical points or as narratives of an individual student's achievements, strengths and developmental needs, with emphasis on providing the student and his or her parents with detailed information on the improvement of those developmental needs.

Tamariki School in New Zealand has made it a principle that "mistakes are regarded as important learning information" and has developed corresponding guidelines for teachers on the school's culture of formative assessment. At Tamariki School, Institut Beatenberg and most other alternative schools children are encouraged to compare their work and skills with their own previous achievements and their own goals. Teachers are responsible to ensure that assessment processes are non-invasive and do not provoke anxiety. At Tamariki School, teachers have to ask a child's permission before retaining samples of their work. It is the teacher's responsibility to relate the child's learning to the national achievement objectives and to identify causes of difficulty. The

overall principle underlying the culture of assessment at most alternative schools is to support the individual child on the basis of a "credit" not a "debit" model.

Alternative education in light of recent research in the learning sciences

The emergence of the learning sciences (Sawyer, in this volume) allows for a critical reassessment of alternative models of learning in light of what we know about the cognitive and social processes that result in effective learning. The criticism of the standard model of schooling expressed over the past two centuries seems to have gained new support in light of recent findings in the learning sciences. On the one hand, they confirm the shortcomings of the traditional transmission and acquisition model of schooling; on the other hand, they provide empirical support for core features of many alternative schools: their instructional methodology focusing on experience and reflection, their integrated curriculum and their focus on independent and customised learning combined with formative assessment.

There is sound evidence now showing that the "deep conceptual understanding of complex concepts, and the ability to work with them creatively to generate new ideas, new theories, new products, and new knowledge" (Sawyer) is best achieved in complex social settings enabling processes that involve learners, tools and other people in the environment in activities in which knowledge is being applied. Traditional structures of schooling "make it very hard to create learning environments that result in deeper understanding" (Sawyer, in this volume). These findings provide backing for the experiential, project-, problem-based and collaborative learning that many alternative schools have been focusing on. In constructivist learning environments, students gain expertise from a variety of sources beyond the teacher (Greeno, 2006). There is also evidence that the knowledge society's need for more integrated and usable knowledge is best met by more integrated and deep (rather than broad) curricula, as used by many alternative schools.

Another area in which the emerging sciences of learning seem to confirm the assumptions underlying alternative schools is their strong focus on the individual learner. It is now clear from cognitive research that learning always takes place against a backdrop of existing knowledge, which differs from learner to learner. Whereas many traditional schools still practice a "one size fits all" model, according to which every student of a certain age is supposed to learn the same thing at the same time, most alternative schools provide their students with a more customised learning experience, often mixing students of different ages in the same classroom. Findings from the learning sciences reconfirm the potential effectiveness of individualised forms of learning as long as the learning settings are sensitive to the learners' pre-existing cognitive structures. More independent, negotiated forms of learning, as practised in alternative schools, also seem to prepare for the knowledge society's requirement of intrinsically motivated individuals able to take responsibility for their own continuing, lifelong learning. Finally, alternative schools seem to be able to contribute to some extent to the quest for more effective forms of assessment testing profound rather than superficial knowledge on the one hand and facilitating further learning through formative feedback on the other.

Given the range of features at alternative schools that seem to make sense from a learning sciences perspective, could alternative schools thus serve as models for a broader renewal of mainstream education in the knowledge society? To a certain extent, it seems, alternative schools have already played that role in recent years, because so many of the instructional strategies and assessment techniques they developed have impacted learning and teaching in public school systems across the world.

Nonetheless, it needs to be said that so much depends on the professionalism of individual teachers, be it in mainstream or alternative education. To assess the effectiveness of any alternative pedagogical approach, it would thus be necessary to take a closer look at teacher professionalism and the measurable effects of learning.

Deep understanding (Carver, 2006) develops when learning is integrated with reflection or meta-cognition. Most effective learning takes place when teachers help students to achieve their learning goals and to articulate their developing understanding through scaffolding, which "is gradually added, modified, and removed according to the needs of the learner" (Collins, 2006, Sawyer, in this volume). Effective learning requires a high level of teacher professionalism in the design of learning environments and experiences and the scaffolding of individual students' learning. To foster effective learning, teachers, at alternative and mainstream schools alike, need the ability to facilitate learning in individual, small group and class settings.

Wherever educational alternatives combine customised learning with collaborative group learning in authentic, inquiry-oriented projects, provide their students with access to diverse knowledge sources and assess them for deeper understanding and further learning, alternative schools seem to be ahead of mainstream education and can serve as meaningful models for the renewal of mainstream education across the globe.

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Waldorf schools: Association of Waldorf Schools in North America: *www.awsna.org* and European Council of Steiner-Waldorf Education: *www.ecswe.org*