

# Equity and quality as aims of education

## *Teachers' role in educational ecosystems*

*Hannele Niemi*

Faculty of Educational Sciences, University of Helsinki, Finland

### **Abstract**

With increasing access to education worldwide, the quality of education, including the development of skills and competences for learning in schools or adulthood, has become an urgent challenge. In this chapter, questions of equity and quality in education are explored from the viewpoint of educational ecosystems. The major aim is to analyze teachers' role in the system. Teachers are the cornerstones of education, but they cannot improve schools alone. Developing schools' provision of high-quality learning to all children demands macro-level structures and school conditions where teachers can work as real professionals. Also necessary is interaction and interconnectedness between and within different levels of the system. In the teaching profession, teachers' commitment to ethical standards provides a basis from which to integrate equity and quality, but it requires both active dialogue between partners at the national and local levels and continuous professional development.

### **Keywords**

Equity – Quality – Education – Teachers' role – Educational ecosystems

### **Increasing inequalities**

Globally, access to education has increased over the last 20 years. More than 90% of children have the opportunity to go to school at the primary level (UIS, 2020). In last 20 years, there has been a huge push toward providing education to most children. However, recent statistics suggest that inequalities in education remain the reality, even though access has been improved. More than 250 million children are out of school when the secondary level is considered (UNESCO, 2018; World Bank, 2018). Access to the secondary level is still difficult because of low learning performance or failure to complete primary school of primary school entirely (UNESCO, 2018; UIS, 2019; World Bank, 2018). Future scenarios in education are highly alarming. Forecasts indicate that by 2030, more than half of the world's young people—over 800 million—will not have basic skills in reading and math (e.g., Education Commission, 2016). In the 2019-20 school year, we faced a new challenge from the COVID-19 pandemic. It has closed schools in 132 countries for 1,048,817,181 students and has affected 59.9% of total enrolled learners worldwide (UIS, 2020), deepening the existing gap in learning opportunities. Global statistics from recent years also demonstrate that there are huge differences in students' learning outcomes from country to country, especially in reading and math skills (World Bank, 2018). In some countries, after four years in schools, students cannot read sentences or perform the easiest mathematical tasks. From an equity point of view, Access to education, though it is a basic and necessary condition of equity, is not enough to achieve it (see UIS, 2019; World Bank, 2018; European Commission, 2017). One must also question what the quality of education is and how equity and quality of education are connected.

Both concepts—equity and quality—have been discussed for decades in education (e.g., Gorard & Smith, 2004; OECD, 2012, 2018; Trifonas, 2003), and their definitions and indicators vary. Often the concepts have been investigated separately or approaches to them have been narrow (e.g., focusing on equal opportunities that emphasize equal chances). Equity requires taking a wider perspective and setting demands for breaking barriers, asserting that different learners must be supported in such a way as to allow them to use equal opportunities. Discussions on the quality of education have often assessed only students' performances without focusing on the real reasons for success or failure in schools, neglecting inputs like macro-level investments in teacher education or unequal structures in society in a wider sense. Altogether, many traditional factors of educational marginalization, such as gender and residence,

combined with income, language, minority status, and disability, particularly in low-income or conflict-affected countries (UIS, 2019), prevent students' learning performances. This is the case in many developing, low income countries, but it is not unknown in mid- and even high-income countries. The reasons are often political, system-wide deficiencies in educational structures, teachers' low competences, family poverty, or attitudinal factors, such as parents who do not recognize the value of schooling or the common attitude and belief that females do not need an education (OECD, 2012; UIS, 2019; World Bank, 2018).

Recent analyses and discussions have revealed that equity and quality should be connected (Garira, 2020; Kyriakides et al., 2019; OECD, 2012, 2018). Equity is not only about providing access to education: it requires also support to help students enter educational paths. Equity also includes the idea that quality learning requires high-standard educational services that promote learning for those who have difficulties. Quality should be connected with inputs, processes, and outputs, as well as their interrelationships. In addition, these concepts should be set in their wider ecological contexts, ensuring that different learners are supported at all levels of education.

In this chapter, equity is seen as a policy-making term in the context of an educational ecosystem meaning that learning opportunities for all types of different learners are supported not only by national or local educational authorities and stakeholders but also through teachers' work. It involves more than providing equal opportunities. Quality of learning is understood as the growth of learners' capacity to manage their learning and have a readiness to continue it based on previous knowledge construction. It goes beyond the repetition of knowledge and setting requirements for schools and teachers to provide knowledge that is meaningful and relevant to learners and their futures. Quality of learning is an indicator of the quality of the educational system, but quality of education is more than students' performances. It also involves the quality of inputs into educational services at different levels of the system. It requires that the system is working in a way that is interconnected with its different parts, and that teachers' work is tied with all levels of the system to aim towards equity and quality.

In this chapter, questions of equity and quality in education are reflected upon from the viewpoint of the educational ecosystem and teachers' roles in it. The aim is to analyze teachers' opportunities and challenges in promoting equity and quality in education. Even though teachers play an important role, we have to ask how they can really contribute to education. The first concept of the ecosystem will be

introduced and analyzed to explore how teachers can promote equity and quality in education.

### **The educational ecosystem widens concepts of quality and equity**

The concept of ecosystems is rooted in biology (e.g. Dowd, 2019; Mars et al., 2012). The most important features of ecosystems are the interconnectedness of their constituents and the information flows that exist throughout the system. Diversity is also an essential feature in natural ecosystem, ensuring the functioning of the system. We have learned from ecological studies that systems function well when their different parts work together.

The concept of ecosystems has emerged in medicine and health care (Kahn et al., 2012; Walpole et al., 2016), the social sciences (Oksanen & Hautamäki, 2015; Schwindt et al., 2016), and educational discussions (Niemi, 2016a; Niemi 2021; Niemi et al., 2014). Ecosystems have also been used in technological environments to describe the importance of different partners working together (Moore, 2006). Mars et al. (2012) analyze the value of this concept, noting that the metaphor has provided a fresh lens through which to view a world that is inherently interconnected.

The concepts of education systems and educational ecosystems share many features, but the ecosystem approach places an emphasis on the interconnectedness between different parts and actors. Niemi (2016a, 2021) notes that an educational ecosystem has complex connections and processes that interact with different levels of society and social structures. We can refer to a macro-level, which consists of all the structures of the entire educational system, from childhood to adult education. These structures include the national curriculum, educational evaluation systems, and life-long learning strategies for ensuring competences throughout the course of life. Essential viewpoints for this level involve exploring how these structures promote or hinder equity and quality and how teachers can contribute to these goals. In education, there are also meso- or mid-level units, such as schools and other educational institutions, with their own structures and social practices, such as leadership figures and their roles and responsibilities at the institutional and community levels. This level consists of a variety of processes, including how inclusion and other aspects of equity are implemented in schools. We can also observe micro-level ecosystems,

where individuals, such as students in the classroom and teachers as representatives of their profession, are influenced by their individual characteristics and backgrounds. Ecosystem thinking also regards connections with other systems in society as crucial, such as connections with health care, social services, and even housing and living circumstances. Ecosystems include the idea that changes are systemic: that is, reforms for equity demand changes in many parts in the system. This connection also helps us to see how equity and quality are interdependent. Garira (2020) and Pischetola & de Miranda (2020) claim that we need a systemic approach, particularly when equity and quality are important aims of the system. When looking at teachers' roles in education, there is always a danger that we will see their roles too simply, only considering how they work as knowledge transmitters. In the next section, teachers' work is reflected upon through the ecosystem lens.

### **Teachers as part of educational ecosystems**

Teachers are regarded as cornerstones in educational system (e.g., Cochran-Smith 2020; Darling-Hammond, 2005, 2017; Darling-Hammond & Lieberman, 2012; Council of the European Union, 2014; Lefty & Fraser, 2020). European Commission (2017, p. 8) expresses "High quality, motivated and valued teachers are at the heart of excellent education." Teachers can make a difference in students' life, and this evidence has been available since decades; (e.g., European Commission, 2013; Good et al, 1975; Hattie, 2003; Maloney et al., 2019; Niemi & Lavonen, 2020). Also already, in 1990' Hargreaves and Fullan (1992) regarded teachers as change agents in education. However, we have also evidence (e.g., Andrews, 2020; Vallory, 2020) that teacher have very little opportunities work as change agents because of political conditions, historical roots or deficiencies in teacher education systems. The essential question is what kind of teacher' professional role and working conditions are needed that teachers can work for equity and quality.

When analyzing teachers' role in the ecosystem, we can see educational systems are complex, they have long historical roots, and they are connected with political purposes. This can be found in many countries in different part of the world (e.g., Lefty & Fraser, 2020). When looking more closer inside the system, we can see that teachers are seen as the most important parts in the system. However, the differences can be huge between countries and what is expected from teachers (Lefty & Fraser, 2020).

Often a strong connection with economy of the country, aiming at boosting market economy, providing more competent work force or expectations and demands of innovations that can be ice-breakers e.g. for new industry. In China (Lioa & Zhou, 2020), teacher education can be described with metaphors how it has served national political aims in 20th century, being first cornerstones for national reconstruction then engine for boosting economic growth, thereafter an equalizer harmonizing the society, and finally a window for envisioning a global agenda. Also, in Finland teachers' role for national identity and welfare have been important (Niemi 2016b; Niemi & Lavonen, 2020). Teachers' work is always connected with wider societal aims, not only what happens in classrooms.

***Teacher work is depending on a macro level***

Education is part of society and in educational systems, we can identify different levels. A macro level of the system, national regulations define how education structure is organized and what are educational levels e.g. early childhood care and education, primary and secondary level, adult education and higher education. The macro level also consists of regulations for national curriculum, evaluations and inclusion policy and how teachers are trained. Many practices are rooted in societal processes and in also a nation's history (Lefty & Fraser, 2020; Niemi 2016b; Niemi & Lavonen, 2020). Nationally, often political aims are reflecting in curricula and learning materials impacting on teachers' work. In some countries, especially in U.S.A, evaluation system is based on standardized testing, competitiveness and rankings, often setting also teachers in ranking order based on their students' performances (LeTendre, 2018). In some countries, such as Finland, equity and quality are connected with a national policy (Kumpulainen & Lankinen, 2016) and set goals to the entire educational system and teacher education as part of it. Globally, we have also a lot of debate how international measurements, such as PISA are determining schools and teachers' work (Zhao, 2020). Many researchers' demand more focus contextual factors and quality culture and quality of educational services Reality is also that some countries lack the essential knowledge about educational performances (World Bank, 2018) and also this sets limits for enhancing equity and quality. How much teacher can influence on quality of teaching and learning is depending on their competences but also how they really can contribute to the system if that is regulated by structures to which they cannot influence.

Decisive is what kind of professional role society has given to teachers. The concept of the profession is often used to describe medical doctors'

or layers' work. Professions are societal institutions that specific features, such as a long, high quality education in institutions that have been audited or accredited, quality criteria for entering to profession, codified body on knowledge as basis for the profession, wide autonomy and responsibility to develop own work and ethical code of conduct for working in profession (e.g., Cruess et al., 2004). How teachers can be professionals have a long debate (Hargreaves & Fullan 1992; Howsam, 1976; Lefty & Fraser, 2020; Niemi, et al., 2018; Tom, 1984). Teachers can be seen also as representatives of a profession but this role requires structures and conditions to work as agents that can act and make improvements in their work.

Teachers can make a difference, but the failure of students is not depending on their low capacity or not even on their teachers. An irrelevant curriculum and lack of support (Field et al., 2007; OECD, 2012) are real reasons behind of the failure. If teachers are very tied with details of the national curriculum and also testing is strengthening that, teachers' opportunities to modify teaching to local and individual needs is very limited. And vice versa, in the contexts where teachers have high competence, professional autonomy and macro level other systems support their work, they can implement their professional role for making education that matters on students learning. We have learned also teachers can make difference in both centralized and decentralized education system; Singapore as an example of centralized system and Finland as a representative decentralized system. Both are well-performing educational countries. They are culturally, politically and geographical different, but the common aspect is a strong teacher education, effective support and respect for teachers from local or national authorities (Low, 2018; Niemi et al., 2018; Tan & Liu 2015). The status of teachers, given by the macro level decisions, is essential for making teaching profession attractive for talented and motivated applicant to teaching profession. In some countries, as examples England (Andrews, 2020) and USA (Lefty & Fraser, 2020; LeTendre, 2018) a macro level trend is de-professionalization of teachers' work (Milner, 2013). It leads to a situation where official qualifications are not either required or they are short-term practical training. That has influence on teachers' work, most often lowering attractiveness of the teaching occupation and retaining in the school work (Goodwin, 2014).

From ecosystem perspective, it also decisive how macro level structures, for example teacher professional role and status, curriculum and evaluation systems and teacher education are working together for equity and quality. If each macro level part is working very separately and

there is not information flow as needed in ecosystems., coherence of the system is missing, it is fragmented, and the system loses its effectiveness. Also, if some parts, for example high stake testing is dominating, the system can be very bias and narrow and set barriers for student progress, particularly if inclusion policy is weak or missing. In these cases, teachers have very limited chance to influence to work in their profession.

### ***Teachers at an institution level***

Schools and other educational institutes are mid-level structures in educational systems. Teachers' work is depending on macro level regulation and professional role but their work happens mainly in school communities. How students can have high quality education and be treated equally, and equity is ensured is depending on teacher's capacity. Tan & Liu (2015, ix) describe when introducing the publication about teacher effectiveness in our global world that is in continuous changing process: "In this challenging time, we need teachers who inculcate in their students a deep love for learning, and empower them so that they can become self-directed and collaborative learners." Teachers can have wide impact on students' life (Kyriakides, et al. 2019) by promoting equality and preventing discrimination.

A teacher matters, but school is more than individual teachers (Vangrieken et al., 2017). School is a social construction that has values, norms and practices. They have grown and maintained by a social community. This is important when thinking diversity of students and inclusion. The macro level regulations, for example about all students' right for high quality learning, is not necessarily realized if teachers' or even the whole school community's attitude do not fully accept the inclusion (e.g. Saloviita, 2020). There may be a law, teachers neither can implement it because of attitudinal restrictions that are often connected with lack of resources or competence. In these cases, the law becomes powerless. And, also vice-versa teachers can make a difference, even in the most difficult conditions Teachers' moral commitment to their profession is a strong resource for integrating equity and quality. (Goodlad et al., 1990; Niemi, 2014; Oser, 1991, 1994; Tirri, 1999, 2008, 2019; Tirri & Husu, 2002; Tirri & Toom, 2020; Tom, 1984). A professional code of ethics outlines often teachers' main responsibilities to their students and defines their role in students' lives. In some countries, such as Ireland, teachers' code of conduct covers interaction with students, colleagues, and in the whole school community (Teaching Council, 2016) and in Finland responsibilities cover also contributions in society (Ethical Committee for the Teaching Profession, 2020). Toom and Husu (2016)



describe that teachers work is wide and their responsibilities cover relationships with students, parents, colleagues, and developing learning environments. The work is often hard and teachers need collaboration and sharing challenges they meet in their work.

Fritz Oser (1921, 1994) and Kirsi Tirri (1999) have analyzed teacher's work from moral dilemmas' perspective pointing out how important ethical reflections are in teachers' work. Oser has created a model that consists of justice, caring and truthfulness. Teachers should keep them all integrated. A dilemma grows if all of them are not implemented. A core of the profession is moral commitment of teachers and how they work in real situations of the school.

From ecosystem viewpoint, teachers' individual efforts are needed but the school work as a community. The essential is how interconnectedness, information flow and diversity are creating a living unity that aims at equity and quality, In schools, there can be also silos that are departments based on subject matters, teachers are working alone, without collegial support and cooperation. The culture of the school is depending on leadership and how responsibilities and power has been divided in a school community (e.g., Hilty, 2011; Lieberman & Friedrich, 2010). Teacher leadership is a concept that describes how teachers can be influential in a school community.

#### ***Teacher at a micro level***

A teacher is also a person and has his/her individual features. Teachers' professional development and growth have been investigated since decades using different conceptualization (Avalos, 2011; Blömeke, & Kaiser, 2017; Caena, 2014; Hargreaves & Fullan, 1992). Teachers are described in terms of expertise development, teachers' agency, identity formation, life histories, constructivist conceptual change (e.g., Dreyfus & Dreyfus, 1986; Feiman-Nemser, 2008; Hargreaves & Fullan, 1992; Huberman, 1992; Livingston, 2018; Maskit, 2011; Schön, 1987). In all theories, teachers are seen a learner and growing to the demands of the profession. Recently theories of dynamic and adaptive expertise (Beltramo, 2017; van Tartwijk et al., 2017; Männikkö & Husu, 2019) has brought front changing situations where teachers work (see also Lee & Tan, 2018). The work requires renewing own capacity. Teachers' development is seen adaptive, reflective, and reformative. Anthony et al. (2015, p. 109) describe, expertise is understood as "not being directly related to teaching experience — the traditional novice versus expert division—but rather, as a component of professionalism."

Teachers need continuous learning and learning happens in the contexts, and situations in schools are important learning opportunities (Schultz & Ravitch, 2013). Development happens in an integration of professional demands and teachers' own personal microsystem that can consist of cultural positions, family, traditions, values, worldviews, different disciplines and their values, norms. Teachers own personality is an important tool in the teaching profession. However, teacher's role that is connected curriculum and ethical standards goes over own personal features or e.g., own personal values and attitudes.

Teacher is not free in such a sense that s/he can implement own personal missions without taking account societal requirements, aims in curriculum and evaluation systems. Every teacher has his/her own ecosystem with own history, memories and experiences. A teacher needs to integrate them to own professional commitments. Even though teaching is not a call in such a traditional sense that it calls to serve even in the worst conditions, still commitments to ethical code and deep interest on human development makes it meaningful. To become an agency, teachers need also support.

### **Conclusions**

Teachers cannot change education alone. The chapter brings into discussion what is needed that teachers really could promote equity and quality in education. Teachers are working in a local context and situations. However, teaching happens in educational ecosystem that has macro level structures and regulations, school communities as mid-level institutions of the ecosystem, and finally teachers have their own personal professional development processes at their micro levels. They all impact on teachers' capacity to promote equity and quality in education.

The concept of the educational ecosystem is based on the assumption that different levels are interconnected vertically between levels and there are active cooperation horizontally within the level. Teachers can make a difference in students' life but it needs conditions where parts of the system are in interaction and there are continuous discussion on values and aims of education in society and also on democracy as an essential aim of society (Zeichner, 2020). Teachers' opportunities to promote equity and quality and integrate them in their daily work is depending on the philosophical premises how education is seen as an ecosystem.

Educational ecosystems need common visions and cooperation and it must open to interaction, diversity and information flow. Teachers and teacher education should be in active dialog with different levels of the educational system (Dehghan, 2020; Niemi, 2016a). Their professional role should be accepted and also supported by macro level structures and practices, e.g. teacher education and curriculum and evaluation systems. Without professional competence, autonomy and trust it is very difficult to be in charge of professional responsibilities.

While the ecosystem metaphor is a useful tool for understanding and predicting the conditions that shape and influence systems, it is important to understand differences between biological and human ecosystems. Biological systems are not supported by different constituents' conscious plans whereas, to be effective, human organizations and systems must be based on conscious human actions, strategic aims, and commitments. This set frames and conditions how teachers really can contribute in the system. In educational ecosystems it is a necessary condition is that partners and actors are connected, they are committed on common aims and they share information, and they regard diversity as a resource. We have evidence how hierarchy, bureaucracy, fragmentation, lack of communication cause ineffectiveness in education, resulting in subsystems that are separated into segmented territories, each of which has its own aims, social practices, and power structures.

It is worth to note that system can work very effectively if there is a common aim and all actors are committed to that. However, there is also a danger. The ecosystem cannot be based on a top down management serving power structures and political tools without real dialogue about allowing dialogue and diversity (Burns et al., 2016). Pursiainen (2002, p. 43) writes that that professional institutions are phenomena of a free society and warns "A totalitarian society does not recognize genuine professionalism. A totalitarian society is based on the idea that there is only one and only one right perspective from which all things must be assessed and from which all decisions must be made." In free societies, professional freedom is based on trust and the idea that professionals will serve the common interests of all. If this trust were to be broken, professional freedom and authority would soon be questioned (Pursiainen, 2002).

Teachers' opportunities to work for equity and quality in education is philosophical value issue that has connection to all levels of the educational ecosystem. But it is needed also practical conditions throughout the system. Anders Schleicher (2012) presents the following outlines for combining equity and quality:

- **Combining ambitious standards with strong support.** This requires a shift away from mere control over the resources and content of education and towards a focus on outcomes - directing services towards individual students based on their needs, including services for students requiring special educational or social assistance. It also needs educational networks between individual schools and between schools and other institutions to enable teachers and schools to improve their performance.
- **Government and schools sharing decision-making responsibility.** Schools need to choose their own responses to local condition and how to use results from evaluation and assessments and to reveal best practices and identify shared problems. Both teachers and schools can improve their performance and develop more supportive and productive learning environments?
- **Engaging with an increasingly diverse student body to improve equity in education.** Raising performance levels depends critically on the capacity of education systems to address the needs of poorly performing students and schools.
- **Fair and inclusive education design.** The structure of education systems and the pathways through that system can help or hinder equity. Traditionally, education systems have sorted students into different tracks, institutions and streams according to attainment. This sorting sometimes increases inequalities and inequities

Developing the school towards high-quality learning to all children demands macro level structures and school conditions where teachers can work as real professionals. In teaching profession, teachers' commitment to ethical standards gives a basis to integrate equity and quality but it needs active dialog between partners at national and local levels and continuous professional development. Connecting equity and quality demands in education, that human actors, unlike natural ecosystems, anticipate the future and create conditions that have an impact beyond the present setting and teachers are part of these processes. To this end, educational actors must work together to design, adapt, and create systems that lead to lifelong learning and high-quality education for all. This is a key mission of education.

## References

- Andrews, R. (2020). Crisis and opportunity in teacher preparation in England. In L. Lefty, & J. Fraser (Eds.), *Teaching the world's teachers* (pp. 132–152). Johns Hopkins University Press.
- Anthony, G., Hunter, J., & Hunter, R. (2015). Prospective teachers' development of adaptive expertise. *Teaching and Teacher Education, 49*, 108–117. <https://doi.org/10.1016/j.tate.2015.03.010>
- Avalos, B. (2011). Teacher professional development in Teaching and Teacher Education over ten years. *Teaching and Teacher Education, 27*(1), 10–20. <https://doi.org/10.1016/j.tate.2010.08.007>
- Beltramo, J. L. (2017). Developing adaptive teaching practices through participation in cogenerative dialogues. *Teaching and Teacher Education, 63*, 326–337. <https://doi.org/10.1016/j.tate.2017.01.007>
- Blömeke, S., & Kaiser, G. (2017). Understanding the development of teachers' professional competencies as personally, situationally and socially determined. In D. J. Clandinin & J. Husu (Eds.) *The SAGE Handbook of research on teacher education: 2 Volume set*. (pp. 783–802). Sage Publications.
- Burns, T., Köster, F., & Fuster, M. (2016). Education governance in action: Lessons from case studies. OECD Publishing. <http://dx.doi.org/10.1787/9789264262829-en>
- Caena, F. (2014). Teacher competence frameworks in Europe: Policy-as-discourse and policy-as-practice. *European Journal of Education, 49*(3), 311–331. <https://doi.org/10.1111/ejed.12088>
- Cochran-Smith, M. (2020). Teacher education for justice and equity: 40 years of advocacy. *Action in Teacher Education, 42*(1), 49–59. [doi: 10.1080/01626620.2019.1702120](https://doi.org/10.1080/01626620.2019.1702120).
- Council of the European Union (2014). Council conclusions of 20 May 2014 on effective teacher education. *Official Journal of the European Union, C 183*, 22–24.
- Cruess, S. R., Johnston, S., & Cruess, R. L. (2004). "Profession": A working definition for medical educators. *Teaching and Learning in Medicine, 16*(1), 74–76. [https://doi.org/10.1207/s15328015t1m1601\\_15](https://doi.org/10.1207/s15328015t1m1601_15)
- Darling-Hammond, L. (2005). Teaching as a profession: Lessons in teacher preparation and professional development. *Phi Delta Kappa, 87*(3), 237–240. <https://doi.org/10.1177/003172170508700318>
- Darling-Hammond, L. (2017). Teacher education around the world: What can we learn from international practice? *European Journal of Teacher Education, 40*(3), 291–309. <https://doi.org/10.1080/02619768.2017.1315399>
- Darling-Hammond, L., & Lieberman, A. (Eds.). (2012). *Teacher education around the world: Changing policies and practices*. Routledge.

- Dehghan, F. (2020). Teachers' perceptions of professionalism: A top-down or a bottom-up decision-making process? *Professional Development in Education*, 1–10. <https://doi.org/10.1080/19415257.2020.1725597>
- Dowd, M. (2019). *Ecosystem: Definition, types, structure & examples*. Sciencing. <https://sciencing.com/ecosystem-definition-types-structure-examples-13719218.html>
- Dreyfus, H.L., & Dreyfus, S.E. (1986). *Mind over machine: The power of human intuition and expertise in the era of the computer*. Basic Blackwell.
- Education Commission. (2016). *The learning generation. Investing in education for a changing world*. The International Commission on Financing Global Education Opportunity. <http://report.educationcommission.org/report/>
- European Commission. (2013). *Supporting teacher competence development for better learning outcomes*. [https://ec.europa.eu/assets/eac/education/expert-s-groups/2011-2013/teacher/teachercomp\\_en.pdf](https://ec.europa.eu/assets/eac/education/expert-s-groups/2011-2013/teacher/teachercomp_en.pdf)
- European commission (2017). *School development and excellent teaching for a great start in life. Communication from the Commission to the European Parliament*. The Council, the European Economic and Social Committee and the Committee of the Regions. Brussels. <https://op.europa.eu/en/publication-detail/-/publication/aa9ffc00-4524-11e7-aea8-01aa75ed71a1>
- Feiman-Nemser, S. (2008). Teacher learning. how do teachers learn to teach? In M. Cochran Smith, S.D. Feiman-Nemser, & D. McIntyre (Eds). *Handbook of research on teacher education. enduring questions in changing contexts*. (pp. 697–705). Routledge/Taylor & Francis.
- Field, S. Kuczera. M., & Pont, B. (2007). *No more failures: Ten steps to equity in education*. OECD.
- Good, T.L., Biddle, B.J., & Brophy, J.E. (1975). *Teachers make a difference*. Holt, Rinehart & Wiston.
- Goodlad, J.I., Soder, R., & Sirotnik, K.A., (Eds.). (1990). *The moral dimensions of teaching*. Jossey-Bass.
- Goodwin A.L. (2014). Perspectives on high performing education systems in Finland, Hong Kong, China, South Korea and Singapore: What lessons for the U.S.? In S. Lee, W. Lee, & E. Low (Eds.), *Educational policy innovations* (pp. 185–199). Springer. [https://doi.org/10.1007/978-981-4560-08-5\\_11](https://doi.org/10.1007/978-981-4560-08-5_11)
- Garira, E. (2020). A Proposed unified conceptual framework for quality of education in schools. *SAGE Open*, 10(1). <https://doi.org/10.1177/2158244019899445>
- Gorard, S., & Smith, E. (2004) An international comparison of equity in education systems. *Comparative Education*, 40(1), 15-28. doi: [10.1080/0305006042000184863](https://doi.org/10.1080/0305006042000184863)

- Hargreaves, A., & Fullan, M.G. (1992) Introduction. In A. Hargreaves & M. Fullan (Eds.), *Understanding teacher development* (pp. 1–19). Teacher College Press.
- Hattie, J. A. C. (2003, October). *Teachers make a difference: What is the research evidence?* [Paper presentation]. Australian Council for Educational Research Conference, Melbourne, Australia. [http://research.acer.edu.au/research\\_conference\\_2003/4/](http://research.acer.edu.au/research_conference_2003/4/)
- Hilty, E. B. (Ed.). (2011). *Teacher leadership. The “new” foundations of teacher education*. Peter Lang.
- Howsam, R. (1976). *Educating a profession*. American Association of Colleges for Teacher Education.
- Ethical Committee for the Teaching Profession (2020). *Professional ethics. Teachers-values and ethical principles*. The Trade Union of Education in Finland [OAJ]. <https://www.oaj.fi/en/education/ethical-principles-of-teaching/teachers-values-and-ethical-principles/>
- Huberman, M. (1992). Teacher development and instructional mastery. In A. Hargreaves & M. Fullan (Eds.), *Understanding teacher development*. (pp. 216–241). Longman Publishers.
- Kahn, L. H., Monath, T. P., Bokma, B. H., Glibbd, E. P., & Aguirre, A. A. (2012). One health, one medicine. In A. A. Aguirre, R. S. Ostfeld, & P. Daszak (Eds.), *New directions in conservation medicine: Applied cases of ecological health* (pp. 33–44). Oxford University Press.
- Kumpulainen, K., & Lankinen, T. (2016). Striving for educational equity and excellence: Evaluation and assessment in Finnish basic education. In H. Niemi, A. Toom, & A. Kallioniemi (Eds.), *Miracle of education: The principles and practices of teaching and learning in Finnish schools* (2nd ed., pp. 71–82). Sense Publishers.
- Kyriakides, L., Creemers, B.P.M., & Charalambous, E. (2019). Searching for differential teacher and school effectiveness in terms of student socioeconomic status and gender: implications for promoting equity. *School Effectiveness and School Improvement*, 30(3), 286–308.
- Lee, S., Lee, W., & Low, E. (Ed.). (2014) *Educational policy innovations*. Springer.
- Lee, W. O., & Tan, J. P.-L. (2018). The new roles for twenty-first-century teachers: Facilitator, knowledge broker, and pedagogical weaver. In H. Niemi, A. Toom, A. Kallioniemi, & J. Lavonen (Eds.), *The teacher’s role in the changing globalizing world: resources and challenges related to the professional work of teaching* (pp. 11–31). Brill | Sense.
- Lefty, L., & Fraser, J.W. (2020) Changing paths and enduring debates in US American teacher education. In L. Lefty, & J. Fraser (Eds.), *Teaching the world’s teachers* (pp. 281–300). Johns Hopkins University Press.
- LeTendre, G. K. (2018), Teaching in the USA: Decentralization, inequality, and professional autonomy. In H. Niemi, A. Toom, A. Kallioniemi, & J. Lavonen

- (Eds.), *The teacher's role in the changing globalizing world: Resources and challenges related to the professional work of teaching practices* (pp. 91–108). Brill | Sense.
- Liao, W., & Zhou, Y (2020). Teacher education reform and national development in China (1978-2107). In L. Lefty, & J. Fraser (Eds.), *Teaching the world's teachers* (pp. 111-131). Johns Hopkins University Press.
- Lieberman, A., & Friedrich, L.D. (2010). *How teachers become leaders*. Teacher College Press.
- Livingston, K. (2018). Multiple influences on teachers in changing environments. *European Journal of Teacher Education*, 41(2), 135–137.  
<https://doi.org/10.1080/02619768.2018.1432318>.
- Low, E.-L. (2018). The changing roles of teachers and teacher learning in the twenty-first century: The Singapore story. In H. Niemi, A. Toom, A. Kallioniemi, & J. Lavonen (Eds.), *The teacher's role in the changing globalizing world: Resources and challenges related to the professional work of teaching practices* (pp. 125–140). Brill | Sense.  
[https://doi.org/10.1163/9789004372573\\_009](https://doi.org/10.1163/9789004372573_009)
- Maloney, T., Hayes, N., Crawford-Garrett, K., & Sassi, K. (2019). Preparing and supporting teachers for equity and racial justice: Creating culturally relevant, collective, intergenerational, co-created spaces. *Review of Education, Pedagogy, and Cultural Studies*, 41, 252–281.
- Männikkö, I., & Husu, J. (2019). Examining teachers' adaptive expertise through personal practical theories. *Teaching and Teacher Education*, 77, 126–137.  
<https://doi.org/10.1016/j.tate.2018.09.016>
- Mars, M., Bronstein, J., & Lusch, R. (2012). The value of a metaphor: Organizations and ecosystems. *Organizational Dynamics*, 41(4), 271–280.
- Maskit, D. (2011). Teachers' attitudes toward pedagogical changes during various stages of professional development. *Teaching and Teacher Education*, 27(5), 851–860. <https://doi.org/10.1016/j.tate.2011.01.009>
- Milner, H. R. (2013). *Policy reforms and de-professionalization of teaching*. National Education Policy Center. <http://nepc.colorado.edu/publication/policy-reforms-deprofessionalization>
- Moore, J. F. (2006). Business ecosystems and the view from the firm. *The Antitrust Bulletin*, 51(1), 31–75.
- Niemi, H. (2014). Purposeful policy and practice for equity and quality – A Finnish case. In S. K. Lee, W. Lee, & E. L. Low, (Eds), *Education Policy Innovations*. Springer.
- Niemi, H. (2016a). Building partnerships in an educational ecosystem: Editorial. *CEPS Journal*, 6(3), 5–15.
- Niemi, H. (2016b). The societal factors contributing to education and schooling in Finland. In H. Niemi, A. Kallioniemi, & A. Toom (Eds.). *The miracle of education:*



- The principles and practices of teaching and learning in Finnish schools* (2nd ed., pp. 24–40). Sense Publishers.
- Niemi, H. (2021). Teacher education in at the crossroads—Educational ecosystems for equity and quality of learning. In X. Zhu & H. Song (Eds.) *Envisioning the teaching and learning of teachers for excellence and equity in education*, (pp. 5–23). Springer.
- Niemi, H., & Lavonen, J. (2020). Teacher education in Finland: Persistent efforts for high-quality teachers. In L. Lefty, & J. Fraser (Eds.), *Teaching the world’s teachers* (pp. 153-178). Johns Hopkins University Press
- Niemi, H., Lavonen, J., Kallioniemi, A., & Toom, A. (2018). *The role of teachers in the Finnish educational system*. In H. Niemi, A. Toom, A. Kallioniemi, & J. Lavonen (Eds.), *The teacher’s role in the changing globalizing world*. Brill | Sense. [https://doi.org/10.1163/9789004372573\\_004](https://doi.org/10.1163/9789004372573_004)
- Niemi, H., Multisilta, J., Lipponen, L., & Vivitsou, V. (Eds.). (2014). *Finnish innovations and technologies in schools. towards new ecosystems of learning*. Sense Publishers
- Niemi, A. Toom, A. Kallioniemi, & Lavonen, J. (Eds.). (2018). *The teacher’s role in the changing globalizing world*. Brill | Sense. [https://doi.org/10.1163/9789004372573\\_001](https://doi.org/10.1163/9789004372573_001)
- OECD. (2012). *Equity and quality in education: Supporting disadvantaged students and schools*. OECD Publishing. <https://www.oecd-ilibrary.org/docserver/9789264130852-en.pdf?expires=1603811705&id=id&accname=ocid194948&checksum=ED0BFE160E3A84E9CFAF1606C2E9B13F>
- OECD. (2018). *Equity in education: Breaking down barriers to social mobility*. PISA, OECD Publishing. <https://doi.org/10.1787/9789264073234-en>
- Oksanen, K., & Hautamäki, A. (2015). Sustainable innovation: A competitive advantage for innovation ecosystems. *Technology Innovation Management Review*, 5(10), 24–30.
- Oser, F. K. (1991). Professional morality: A discourse approach (the case of the teaching profession). In W. Kurtines, & J. Gewirtz (Eds.) *Handbook of moral behaviour and development*. (pp. 191–228). Lawrence Erlbaum.
- Oser, F. (1994). Moral perspectives on teaching. *Review of Research in Education*, 20, 57–128.
- Pischetola, M., & de Miranda, L.V.T. (2020). Systemic thinking in education and a situated perspective on teaching. *Ciência & Educação*, 26, <https://doi.org/10.1590/1516-731320200015>
- Pursiainen, T. (2002). Ammattien etiikka [The nucleus of professional ethics]. In Ethical Committee for the Teaching Profession (Ed.), *Etiikka koulun Arjessa* [Ethics in the everyday life in schools] (pp. 35–44, English summary pp. 146–147). The Trade Union of Education in Finland. Otava.

- Saloviita, T. (2020). Attitudes of teachers towards inclusive education in Finland. *Scandinavian Journal of Educational Research*, 64(2), 270–282. <https://doi.org/10.1080/00313831.2018.1541819>
- Schleicher, A. (Ed.). (2012). Preparing teachers and developing school leaders for the 21st century: lessons from around the world. OECD Publishing. <http://dx.doi.org/10.1787/9789264xxxxx-en>
- Schön, D. A. (1987). *Educating the reflective practitioner: Toward a new design for teaching and learning in the professions*. Jossey-Bass.
- Schultz, K., & Ravitch, S. M. (2013). Narratives of learning to teach: taking on professional identities. *Journal of Teacher Education*, 64(1), 35–46. <https://doi.org/10.1177/0022487112458801>
- Schwinda, J., Gilardia, K., Beasleyb, V., Mazeta, J., & Smitha, W. (2016). Advancing the ‘One Health’ workforce by integrating ecosystem health practice into veterinary medical education: The Environment Summer Institute. *Health Education Journal*, 75(2), 170–183.
- Tan, O-S., & Liu, W-C. (eds.)(2015). Teacher effectiveness. Capacity building in a complex learning era. Singapore: Cengage Learning Asia.
- Teaching Council. (2016). *Code of professional conduct for teachers* (2<sup>nd</sup> updated ed.). <https://www.teachingcouncil.ie/en/Publications/Fitness-to-Teach/Code-of-Professional-Conduct-for-Teachers1.pdf>
- Tirri, K. (1999). Teachers’ perceptions of moral dilemmas at school. *Journal of Moral Education*, 28(1), 31–47.
- Tirri, K. (Ed.). (2008). *Educating moral sensibilities in urban schools*. Sense Publishers.
- Tirri, K. (2019). Ethical sensitivity in teaching and teacher education. In M. A. Peters (Ed.), *Encyclopedia of Teacher Education* (Springer Nature). (pp. 1-5). Springer Science+Business Media. [https://doi.org/10.1007/978-981-13-1179-6\\_183-1](https://doi.org/10.1007/978-981-13-1179-6_183-1)
- Tirri, K., & Husu, J. (2002). Care and responsibility in “the best interest of the child”: Relational voices of ethical dilemmas in teaching. *Teachers and Teaching*, 8(1), 65–80.
- Tirri, K., & Toom, A., (2020), The moral role of pedagogy as the science and art of teaching. In K. Tirri & A. Toom (Eds.). *Pedagogy in basic and higher education: current developments and challenges* (pp. 3–13). IntechOpen.
- Tom, A. (1984). *Teaching as a moral craft*. Longman.
- Toom, A., & Husu, J. (2016). Finnish teachers as ‘makers of the many’: Balancing between broad pedagogical freedom and responsibility. In H. Niemi, A. Toom, & A. Kallioniemi, (Eds), *Miracle of education: The principles and practices of teaching and learning in Finnish schools*. (pp. 41–55). Sense Publishers.
- Trifonas, P. P. (Ed.). (2003). *Pedagogies of difference rethinking education for social justice*. Routledge.

- UIS (The UNESCO Institute for Statistics).(2019). *Combining data on out-of-school children, completion and learning to offer a more comprehensive view on SDG 4*. Information Paper No. 61. October 2019. Montreal, Quebec: UNESCO-UIS.  
<http://uis.unesco.org/sites/default/files/documents/ip61-combining-data-out-of-school-children-completion-learning-offer-more-comprehensive-view-sdg4.pdf>
- UNESCO. (2018). *One in every five children, adolescents and youth is out of school worldwide*. UNESCO Institute for Statistics.  
<http://uis.unesco.org/sites/default/files/documents/fs48-one-five-children-adolescents-youth-out-school-2018-en.pdf>
- Vallory. E. (2020). Preparing teachers for the schools we have or for the school we want? Challenges and changes in Catalonia (Spain). In L. Lefty, & J. Fraser (Eds.), *Teaching the world's teachers* (pp. 89-110). Johns Hopkins University Press.
- van Tartwijk, J., Zwart, R., & Wubbels, T. (2017). Developing teachers' competences with the focus on adaptive expertise in teaching. In D. J. Clandinin, & J. Husu (Eds.) *The Sage handbook of research on teacher education: 2 Volume set* (pp. 820–835). Sage Publications.
- Vangrieken, K., Meredith, C., Packer, T., & Kyndt, E. (2017). Teacher communities as a context for professional development: A systematic review. *Teaching and Teacher Education*, 61, 47–59. <https://doi.org/10.1016/j.tate.2016.10.001>
- Walpole, S. C., Pearson, D., Coad, J., & Barna, S. (2016). What do tomorrow's doctors need to learn about ecosystems? *Medical Teacher*, 38(4), 338–356.
- World Bank. (2018). *World development report 2018: Learning to realize education's promise*. <https://doi.org/10.1596/978-1-4648-1096-1>
- Zeichner, K. (2020). Preparing teachers as democratic professionals. *Action in Teacher Education*, 42(1), 38–48.  
<https://doi.org/10.1080/01626620.2019.1700847>
- Zhao, Y. (2020). Two decades of havoc: A synthesis of criticism against PISA. *Journal of Educational Change*, 21, 245–266.

